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THE MACINTOSH® MAGAZINE

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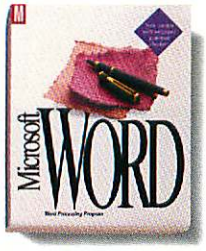
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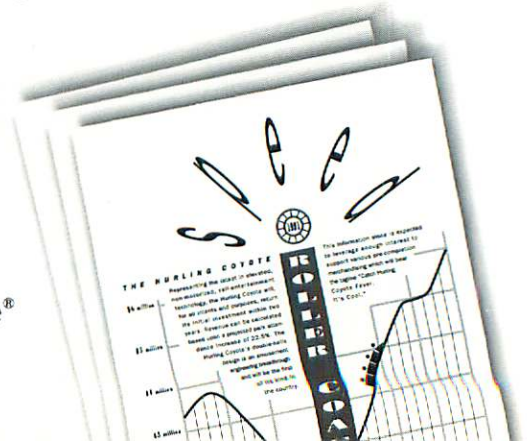
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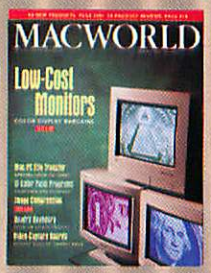
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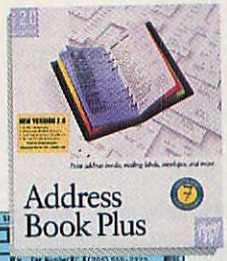
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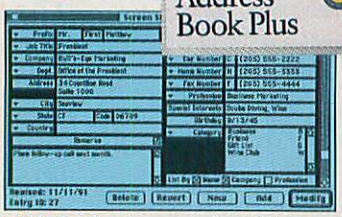


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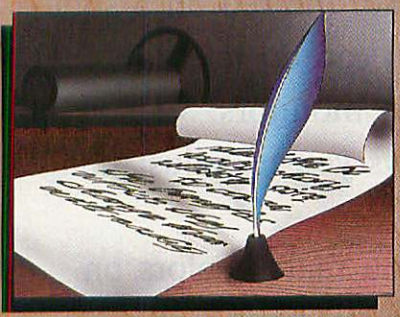
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The Evolution of CAD

From the beginning of time, man has tried to express himself through graphics.

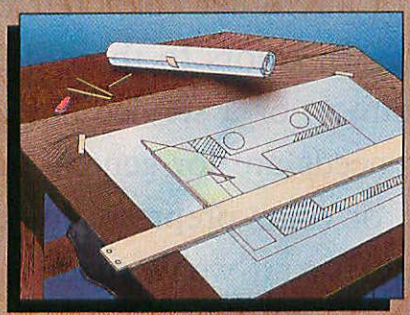
In the beginning man had to use primitive tools for creating graphic designs.





In the 15th Century design tools were quill ink pens and crude styles of paper.

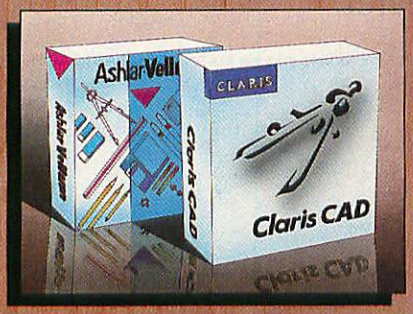
By the 18th Century man had advanced to the drafting table with the T-squares, slide rules, precision ink pens and the dreaded eraser.





In the 20th Century the first CAD programs were very slow and extremely difficult to use, not to mention the expense of buying them.

As programs became easier to use, they thought they were radical and intelligent, but lacked real CAD power.



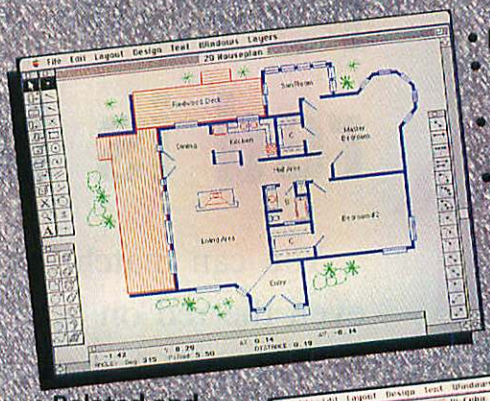
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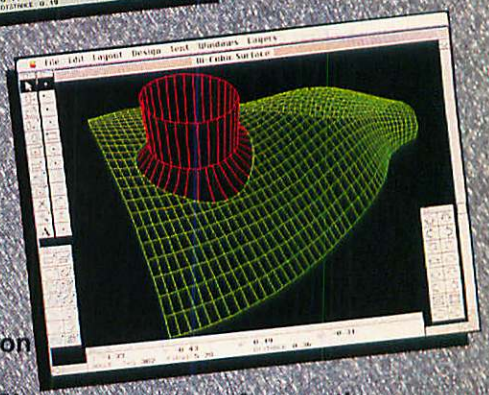
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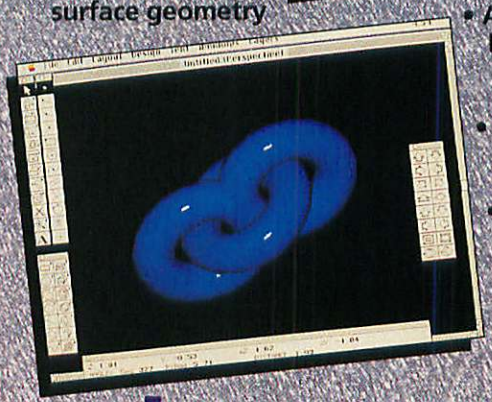
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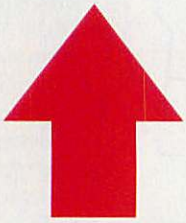
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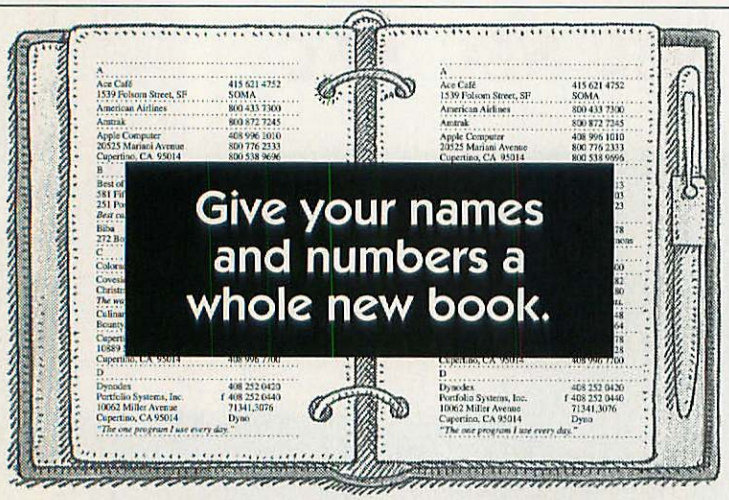
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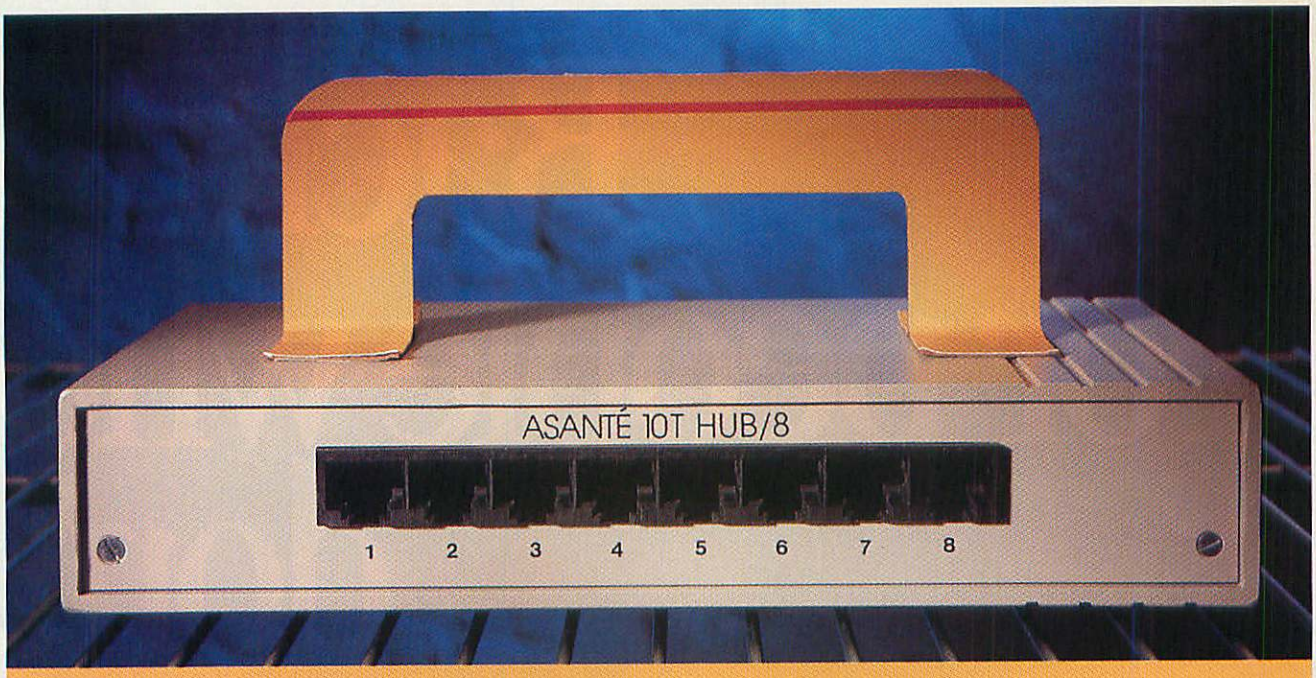
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[ASANTÉ'S AFFORDABLE 10BASET HUB IS JUST RIGHT FOR YOUR NEEDS.]

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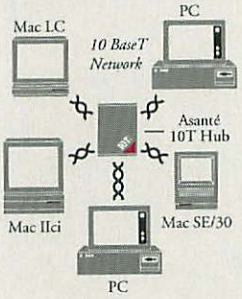
The Asanté10T Hub/8 is a smaller hub at a smaller price.

Asanté™ is extending its leadership in Macintosh networking by bringing the benefits of our outstanding hub technology to more work groups than ever before.

Meet the Asanté 10T Hub/8. A 10BaseT 8-port concentrator that is the perfect solution for groups that need something smaller and more affordable than our popular 12-port hub.

This is an extremely flexible hub with eight 10BaseT ports to let you connect Macs, PCs and other hubs and workstations to your Ethernet™ network via unshielded twisted-pair (UTP) media, plus it has an extra BNC port for thin coax cable. The BNC port and an in/out selectable UTP port allow you to connect to other hubs in a variety of ways.

It's a concentrator that's easy to install because no software is needed. All you do is simply plug it in and turn it on. What's more, because you connect to the 10T Hub/8 in a "star" configuration, it's easy to add or remove nodes.



[Asanté's 10T Hub/8 allows computers to be connected via inexpensive UTP media.]

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It's smaller than most other 10BaseT models and we've made troubleshooting easier with a series of LEDs that will help you determine link status, network traffic and transmission jams.

The Asanté 10T Hub/8. The most economical solution for groups that need something less than 12 ports but won't settle for anything less than the quality of Asanté.

We'd like to remind resellers that Asanté products are available from Ingram Micro, Merisel and Tech Data.

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Circle 24 on reader service card

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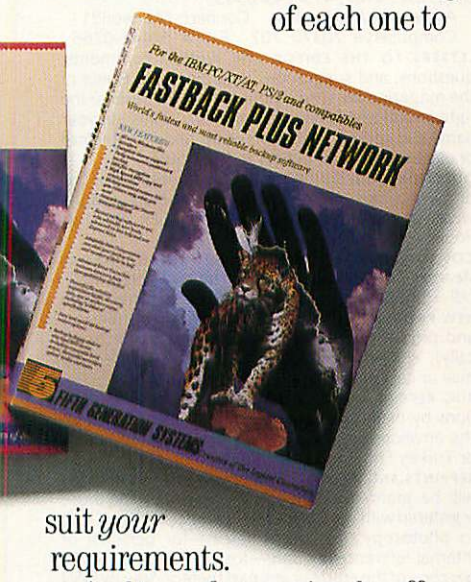
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Now you can.

Now you can set up fully automatic, unattended backups for every Mac in the house.

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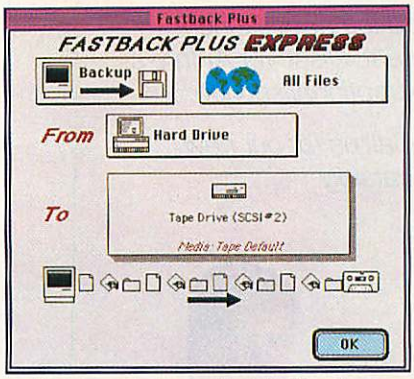


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Along with being System 7 savvy—which means you get to enjoy Balloon Help and other wonderful things—Version 2.6 lets you back up to just about anything you can think of, from floppies and hard disks to direct access and streaming tape drives and any HFS device.

It also lets you back up in the background while you're using an application or two in the foreground.

It even formats floppies on the fly, so you don't have to bother.

And it comes complete with our unique Macro Editor.

What, you ask, makes our Macro Editor unique?

It uses plain English commands. Which means you can actually use it.

Using the Mac version of Fastback Plus is a lot like using the DOS version, the Windows version and the Network version—same look, same functionality.

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That's right. You can actually restore a Mac file directly onto a PC, and vice versa.

Nobody else can do that.

But then, nobody else can back up 1MB per minute on a Mac.

No other DOS, Windows or Network backup program can run fast enough to see our tail lights.

And no other backup software is backed up by our



In addition to floppies, hard disks and other HFS devices, Fastback Plus for the Macintosh lets you back up to direct access and streaming tape drives.

vaunted 24-hour toll-free technical support. And our one-year money-back guarantee.

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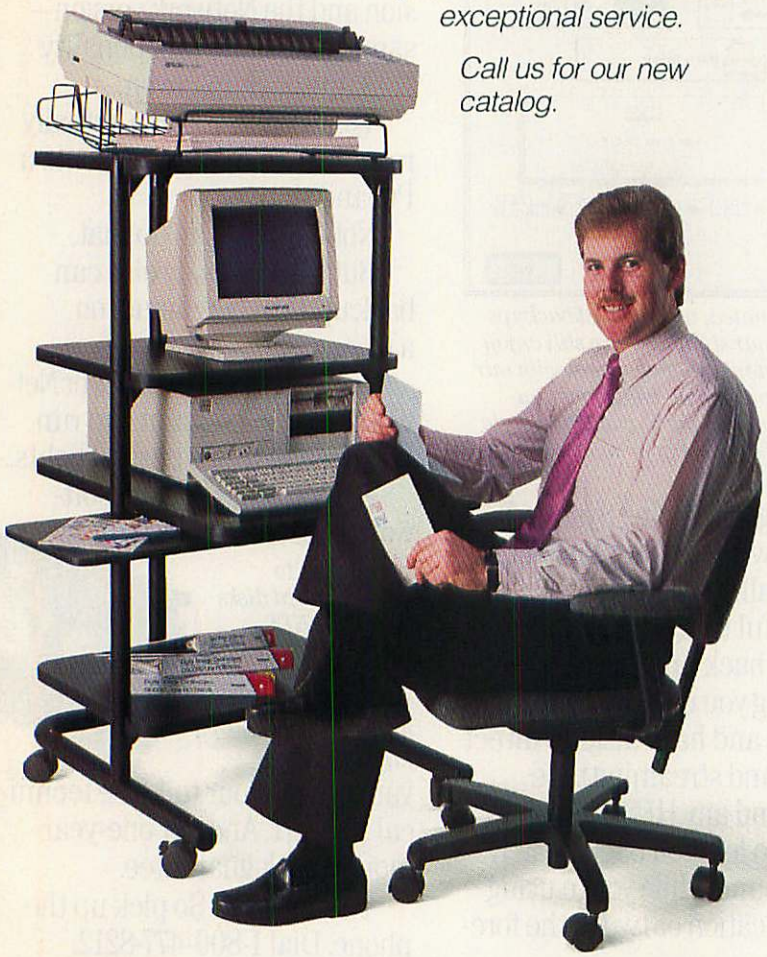
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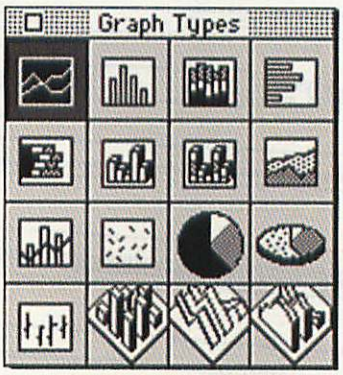
Only one spread and all Macintosh. Ri

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1-2-3 delivers the graphing capability Macintosh was made for. Select from hundreds of variations with a palette full of 3-D, pie, bar, area and scatter graphs.

Its innovative "user interface" makes working with data, text and graphics not only fast and easy, but fun. Like In-Cell Editing, which lets you double click on a cell and then type and edit directly in it. Or the Unified Work Environment, which allows you to manipulate data, text and graphics all in the same file with one set of menus. Change the color of your data the same way you change the color of your graphics. And directly manipulate data, graphs, drawn objects and scanned images.

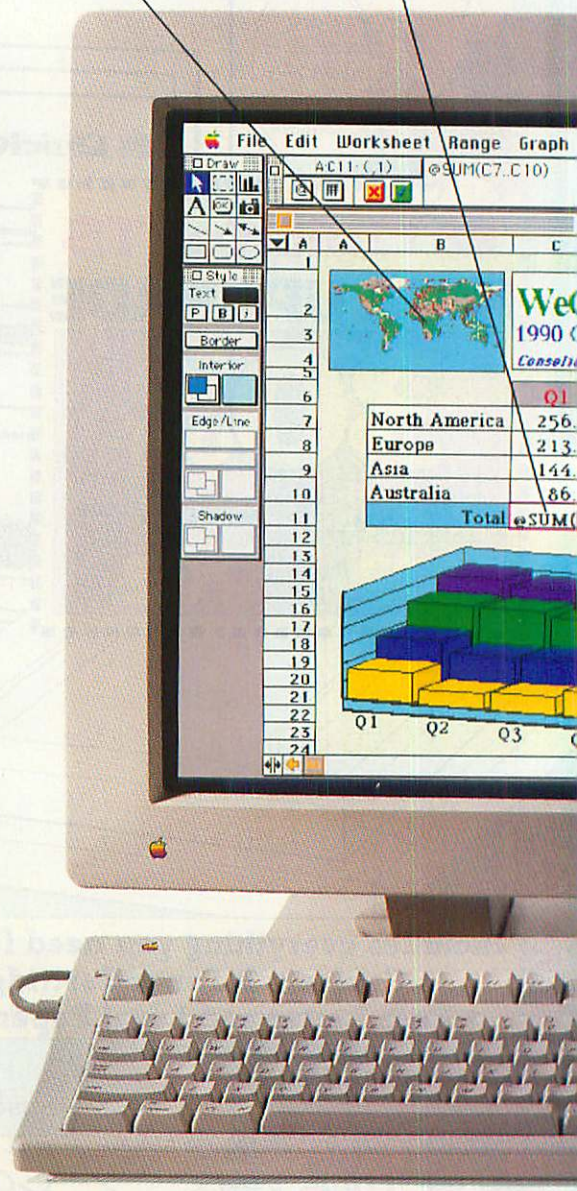
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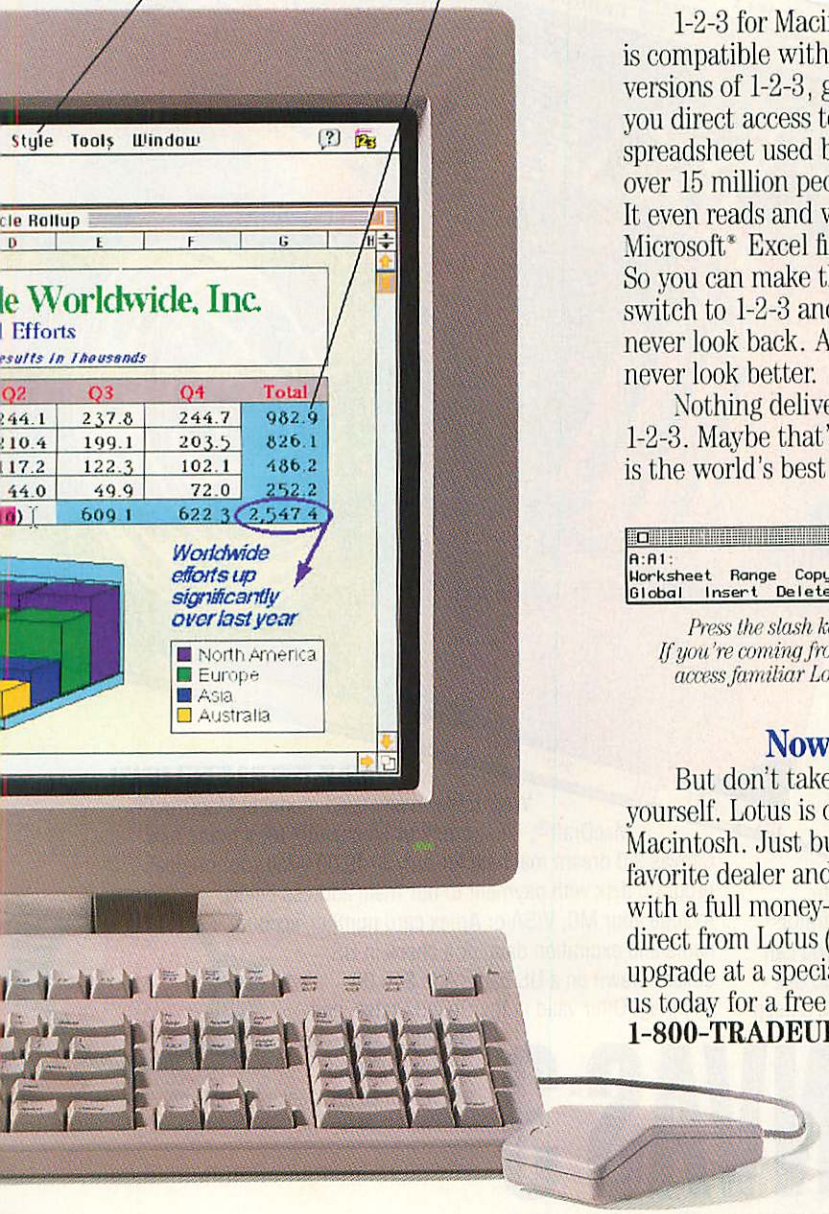


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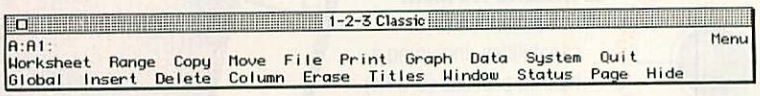
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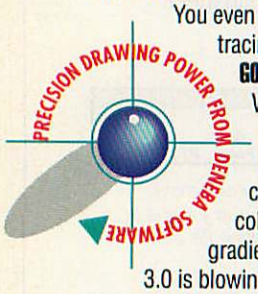
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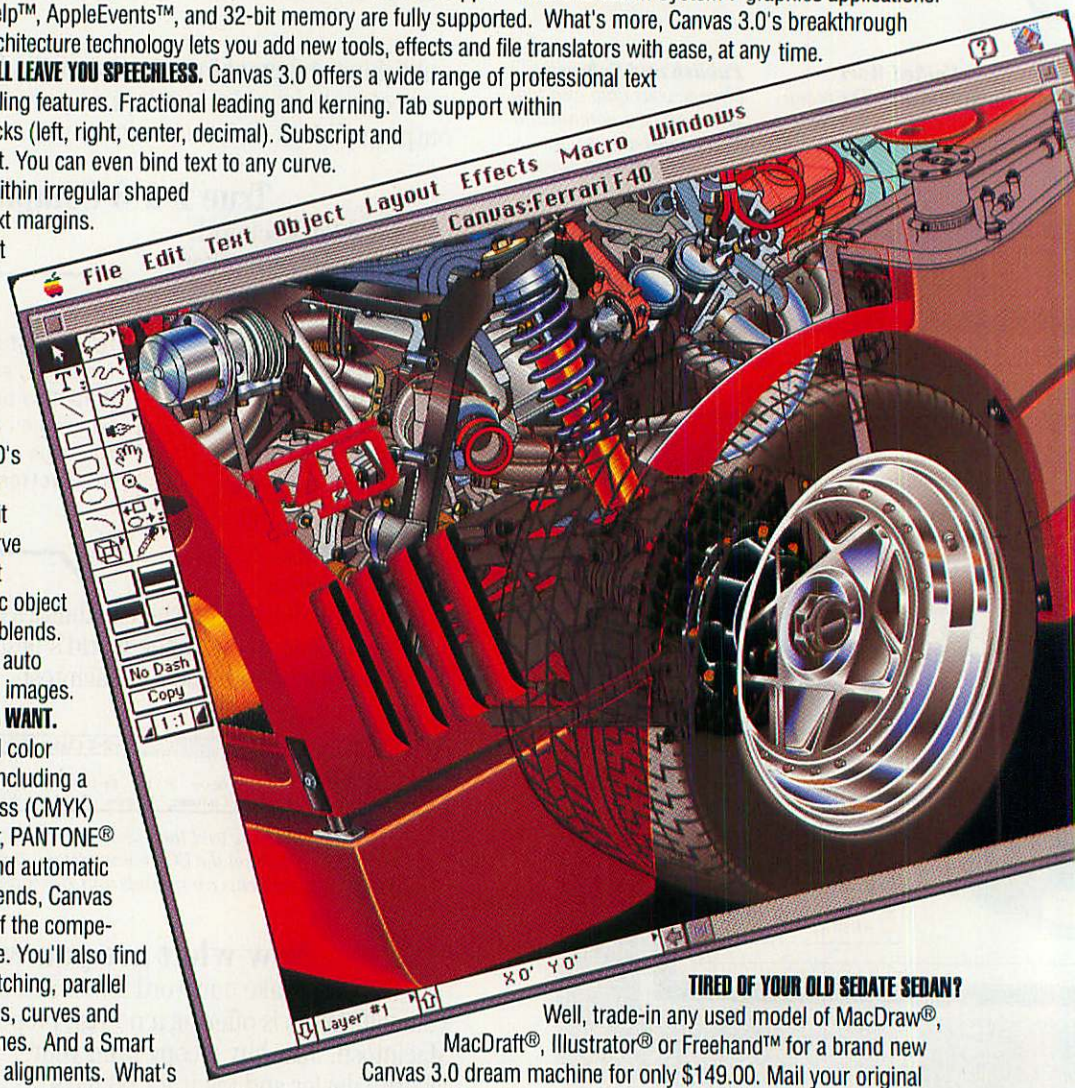
IT WILL LEAVE YOU SPEECHLESS. Canvas 3.0 offers a wide range of professional text handling features. Fractional leading and kerning. Tab support within text blocks (left, right, center, decimal). Subscript and superscript text. You can even bind text to any curve. Wrap text around or encrust it within irregular shaped objects. Fully justify and slant text margins. Apply character by character font scaling. And convert TrueType™ and PostScript® Type-1 fonts into their Bézier curve outlines.

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MacBulletin

LATE-BREAKING NEWS

PowerBook Problems: Apple admits that some floppy disk drives on the Model 140 and Model 170 create a variety of formatting and data-transfer errors. Not all units have the problem. For information call 800/767-2775.

Jasmine drive owners who want to upgrade their software to System 7.0 compatibility can obtain DriveWare 2.0 for $39.95 from Seagull Software (415/361-0928).

Macintosh PC Exchange, a DOS Mounter–like program from Apple, should debut in March. Said by sources close to Apple to have a superior interface and to be less likely to crash than DOS Mounter, Macintosh PC Exchange will probably list for about $99.

Letraset Trims Line: Manhattan Graphics (914/725-4924), the developer of the page-layout software DesignStudio and ReadySetGo, and the presentation software StandOut, has assumed U.S. marketing and support responsibility from Letraset for the three packages.

OneScanner Software Unbundled: LightSource (415/461-8000), which developed the Ofoto software for Apple's new scanner, is planning to sell a version of Ofoto for all Mac-compatible scanners. It will have an improved interface and support QuickTime compression.

Timeslips III has been upgraded to version 2.1. It can search and replace field contents; project timeslips can be set up to enter default data in fields; and time and expense charges can be listed together in bills. List price remains $299.95. Timeslips is at 508/768-6100.

White Pine Software (603/886-9050) has developed several VT 300 series terminal emulators. The $149 Mac320 is a color-capable VT 320 text terminal emulator; the $249 Mac330 is a monochrome text-and-graphics emulator; the $349 Mac340 is a color text-and-graphics emulator. All three can support multiple sessions.

Fractal Design Painter is being upgraded to version 1.2. The new version can combine friskets into complex masks and use friskets as selection tools. Fractal Design (408/688-8800) has provided about 50 paper textures, which are not limited to screen resolution and can be modified by users. Painter lists for $349.

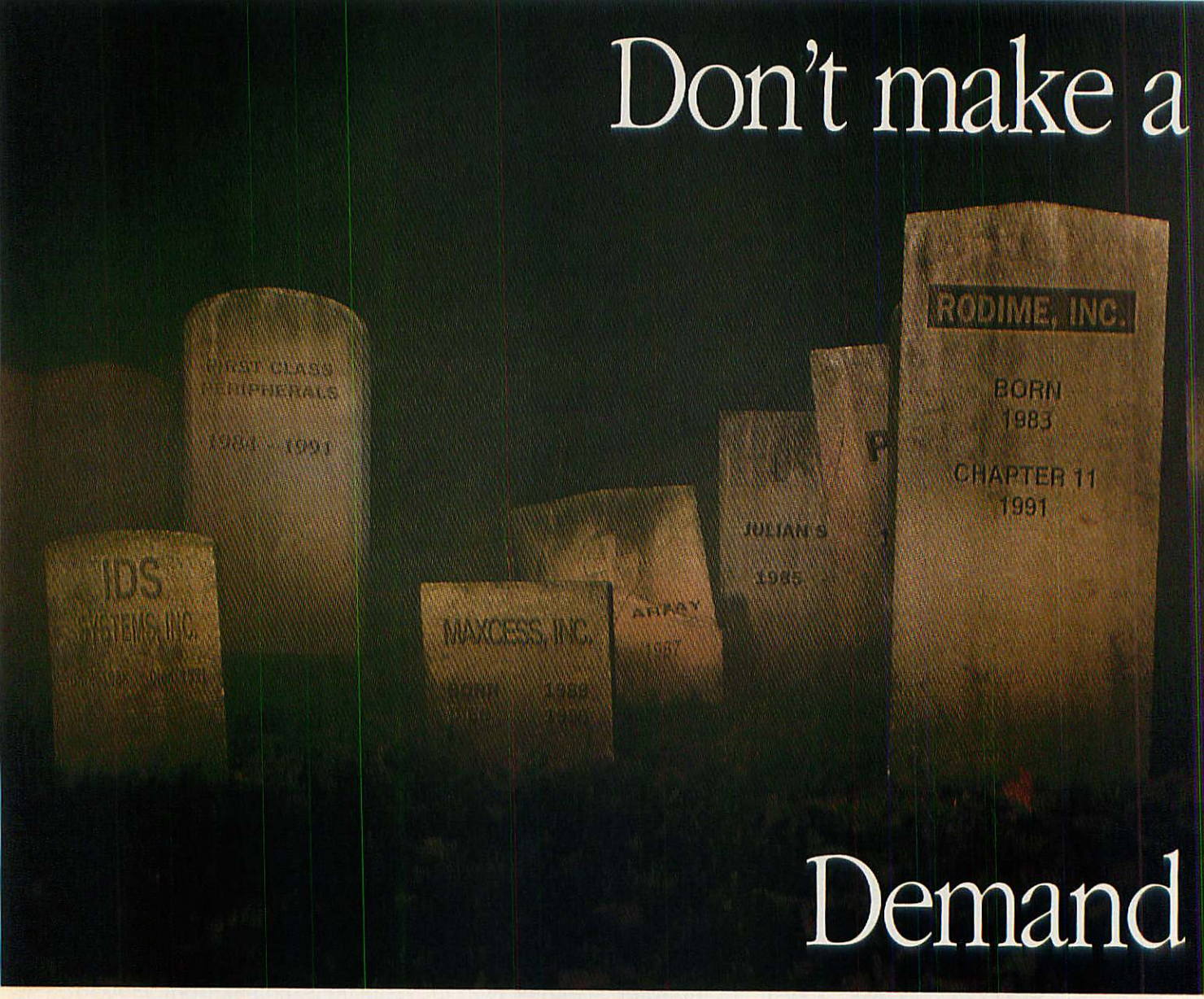
Outbound cuts prices on five of its Mac laptops, with the reductions ranging from $350 to $500. Outbound (303/786-9200) made most of the cuts on its 68030-based machines.

Storage Dimensions (408/954-0710) adds 11 internal drives for the Quadra to its disk drive offerings. The preformatted drives range from 205MB to 1.335GB for the Quadra 900, and from 60MB to 420MB for the Quadra 700.

SyQuest Technology, maker of the most popular removable-drive mechanisms for the Mac, has filed its initial public offering of 2,300,000 shares of common stock.

Open Sesame: Can Opener, which can extract most files' contents, including images in HyperCard stacks, has been upgraded. Version 2.0, $125 from Abbott Systems (914/747-4201), has improved clean-up features for text from damaged files, and provides AND and OR searching. m

Don't make a



Demand

Since the introduction of the Macintosh computer, dozens of hard drive manufacturers have been driving themselves into their graves. Their customers are left in mourning with obsolete relics; without service, technical support, a warranty or a growth path.

You can avoid making a grave mistake by demanding what the editorial reviews don't tell you ... the whole story. The company story. Charts and graphs on mechanism performance and speed won't mean a thing if the editor's choice becomes the undertaker's choice.

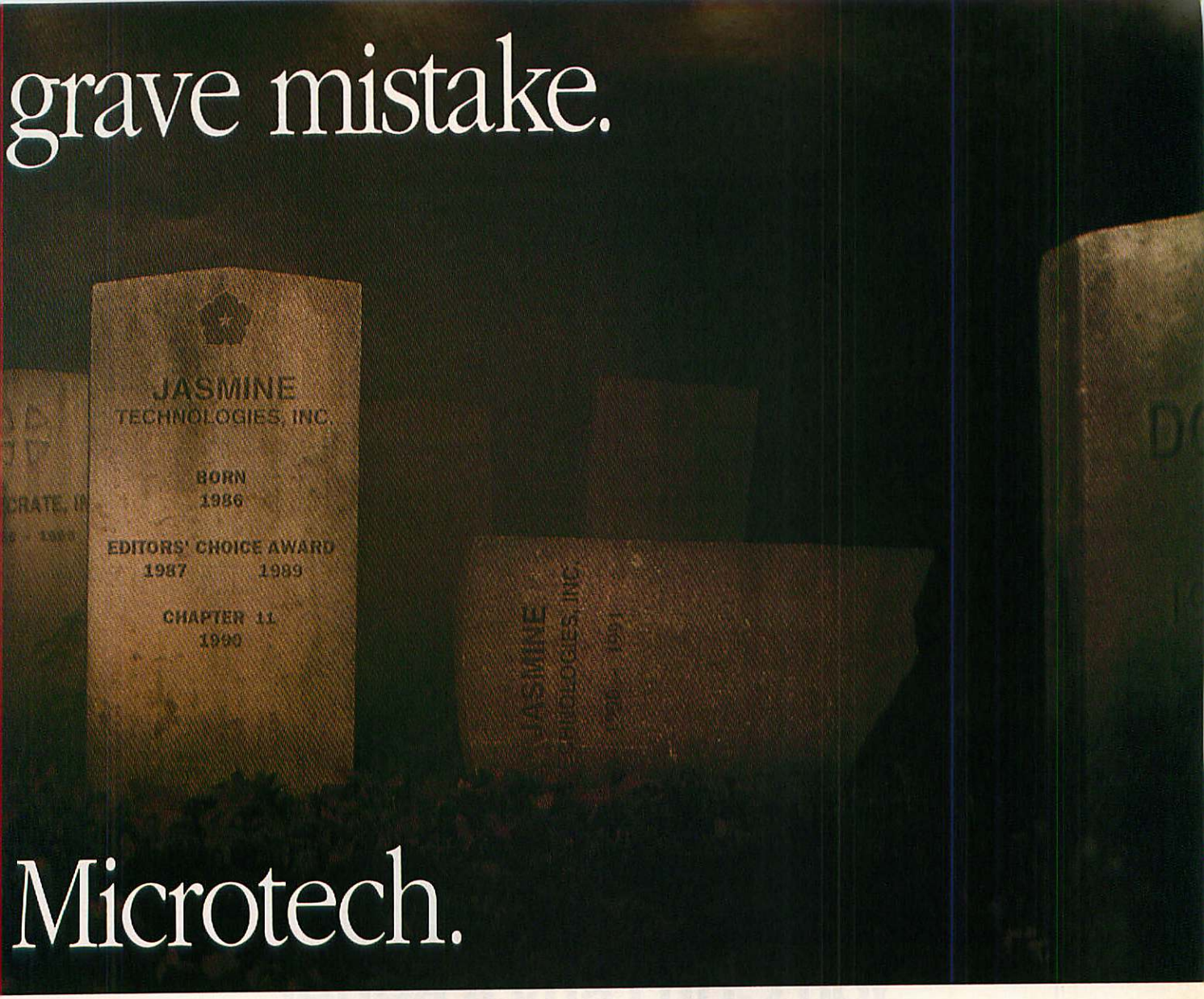
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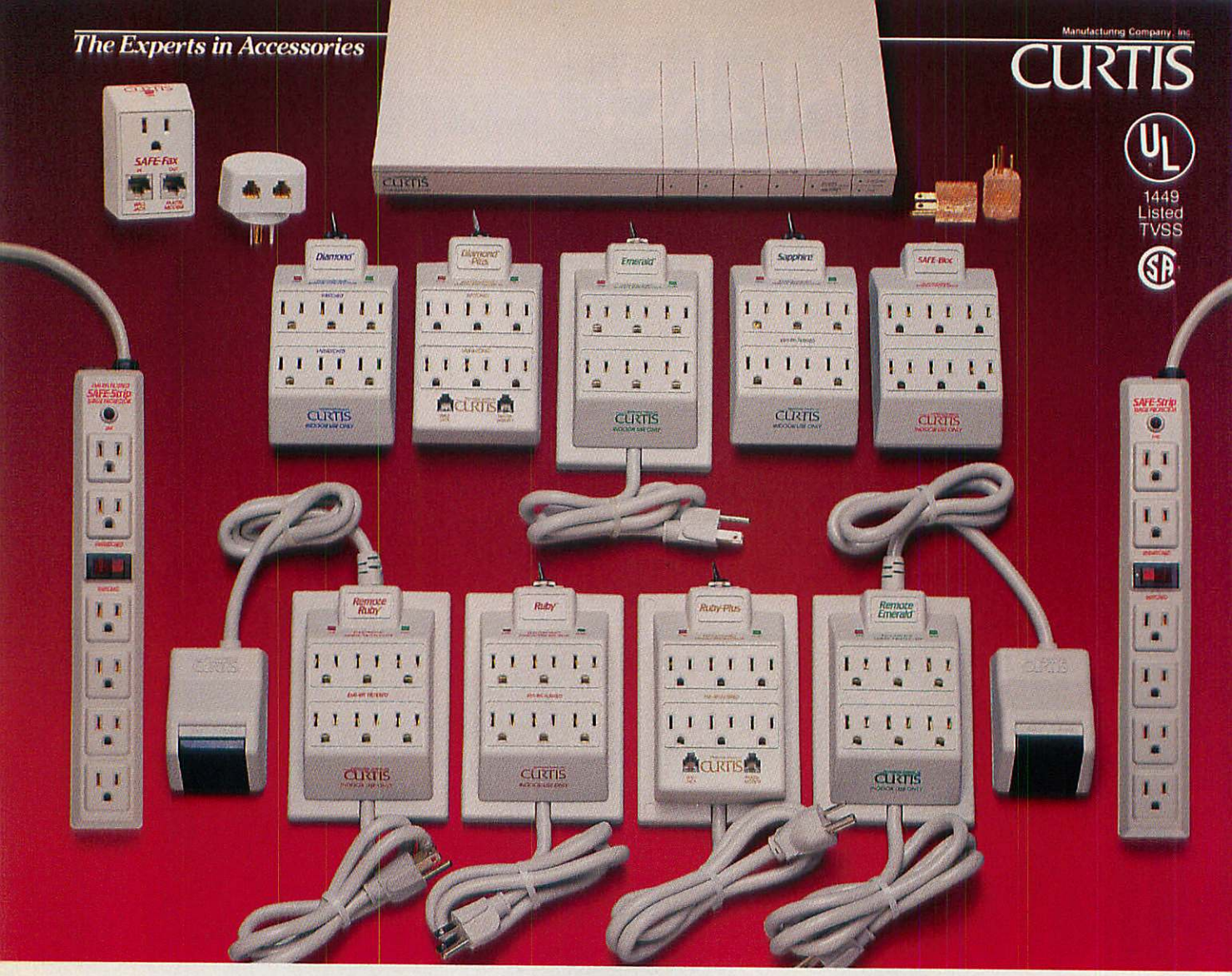
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*Surge protectors are not lightning arrestors and cannot be guaranteed to protect against direct hits.

Circle 20 on reader service card

My Annual Wish List

BY JERRY BORRELL

SINCE MOST OF YOU WILL read this not long into the new year, I thought I would publish my annual wish list in this issue, before Apple officials have tied my hands by asking me to sign nondisclosure statements regarding new product announcements. So here goes, my list of suggestions for the upcoming year.

040-Compatible Software

FIRST AND FOREMOST I'D LIKE SOFTware that will run on a Macintosh Quadra with the memory cache turned on. I'll take a few products to start: Aldus PageMaker, Microsoft Word, and Adobe Photoshop. I don't care if the producers call it a patch or an upgrade, but I don't think it's fair to charge users for an upgrade that simply allows applications to run on new computers such as the 040-based Quadra.

Color Laser Printer

IT MAY SEEM CRUEL FOR ME TO REward manufacturers like QMS and Seiko with a wish that Apple enter their market. Sad to say, there is truth in the old saw that Apple verifies markets. If Apple introduces a color laser printer, more Mac users will buy one, more developers will write software for color printers, and I hope, third-party developers will have an opportunity to make more money by offering color printers that are faster, cheaper, or better than Apple's product.

Color Mac Classic

AND AS LONG AS I'M ON THE SUBJECT of color devices, users have waited too long for Apple to put a small color monitor into the chassis of the Mac Classic family. I'd like to see both a 68030 microprocessor and a small color monitor in the Classic chassis. As long as I'm wishing, I'd like the chassis to be easily accessible for third-party add-ons.

Mail Improvements

I WOULD REALLY LIKE TO BE ABLE to send messages to the editors here at *Macworld* that incorporate video, graphics, sound, voice, and any other kind of data. That's quite a wish, but Apple is in the position to define the underlying structure of mail across AppleTalk networks to make this a reality. In fact, Apple could do this and still leave ample opportunity for third-party developers like CE Software to continue to successfully develop products for the Mac.

Cheap CD Player

THIS ONE HAS BEEN ON MY LIST for a few years now. I suspect that it will come true soon—then I can wish for a faster, cheap CD player.

PrintMonitor

A CHANGE TO THE PRINTMONITOR function is high on my list of the many small, system-related improvements I would like to have for my Mac. For a couple of years I didn't really notice that odd aspect of system software called PrintMonitor. Then after switching to System 7, I began what is now an ongoing relationship with PrintMonitor. Now I stare at the laser printer next to my Mac and then curse at the flashing PrintMonitor icon on my display. Then I select the PrintMonitor function to monitor printing from my Mac—only to learn that I'm waiting. Forgive me, all I wanted to do was print, not get up close and personal with system software.

Really Wizzy Finder Stuff

THIS IS BECOMING AN ANNUAL WISH. Balloon help does help, but I long for the days when I got a subliminal charge every time I looked at my screen. Talking Moose kind of stuff, hierarchical file system type stuff, QuickTime type stuff. Heck. I'd even take neat communications stuff. No more flashing I-beam. Instead, the machine should give you a dialog box like "What's next?" Or HAL's voice from *2001: A Space Odyssey.*



What I'd like to see from Apple this year

ARA Improvements

SPEAKING OF UNGRACIOUS system software, AppleTalk Remote Access (ARA), used for accessing AppleTalk remotely, goes beyond most other system software in terms of adding functionality, but if Apple is really going to intrude on the domain of Farallon's Timbuktu and Timbuktu Remote, it should go all the way and include all of Timbuktu's features. And the whole users-and-groups metaphor needs rethinking. I can't ever remember the name of my computer at home and at the office when I launch the user group function in ARA.

Sort Out SCSI

SCSI PROBE IS NICE. AND IF I HAD time to use it regularly I might remember how it works. What I'd really like is some feature in system software that sorts out all of that configuration crap. Hey, if Apple can design a computer that recognizes the kind of NuBus boards that are installed, why can't the Mac sort out SCSI devices? Improvements to SCSI transfer rates would be a real boon too.

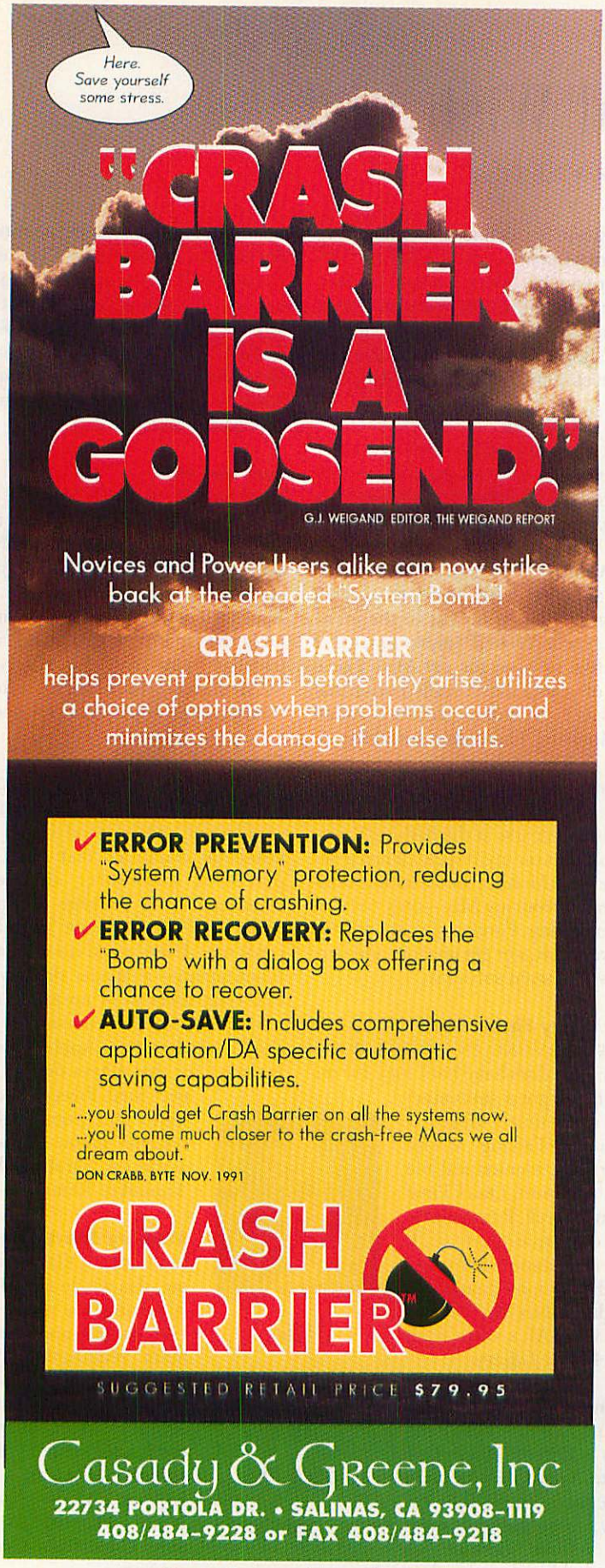
Cheaper Portable

AN INEVITABLE TRUTH ABOUT THE Macintosh PowerBook is that the world could really use a good cheap one. A notebook computer that runs a word processor, spreadsheet, database, and communications package but is cheap enough so that everyone can afford to carry one. Users could do without some functionality—a smaller drive would be OK—but users need portables that are affordable. And of course the modem should work better. Apple should also include a kit that allows owners to connect their PowerBooks to the weird and wonderful phone systems found all over the world, as Farallon did with Timbuktu Remote.

Memory Shortage

JUST BETWEEN YOU AND me, this whole memory thing is getting me pretty PO'ed. Five megabytes is the minimum requirement for any user with System 7 and a few applications. So for starters, Apple should ship machines configured with 5MB. If you agree, write to Fearless Leader, Apple Computer, 20525 Mariani Ave., MS: 38A, Cupertino, CA 95014,

continues



Circle 32 on reader service card.

and join me in this complaint cum wish. And if the company wants to avoid the disaster of a few years ago (when it ordered hundreds of millions of dollars of RAM, which it eventually sold at a loss), then it should encourage third parties to officially supply RAM. And while I'm on the topic, someone should figure out how to configure RAM in increments that ordinary mortals can understand. This entire business of you can't add memory unless you throw out what you already have is too expensive. And hey, are the 2-megabit SIMMs working yet?

030-Based LC

JOHN SCULLEY HAS ANNOUNCED AN LC with a CD ROM drive, so that's no brain-trust wish-list item, but as long as the LC is going to change, add a processor with some gonads, because I'd like to run System 7 on it. And please, put that 12-inch monitor out of its misery.

Death to Irritating Dialog Boxes

I'D LIKE TO SEE A SLOW, LINGERING death for irritating dialog boxes. I refer to such dialog boxes as the one that informs you that an application you want to run prefers this or that amount of memory, and asks if you would like to open up the application with the amount of memory available. I'd rather that the system simply gave it more memory. At the same time, I don't want system software doing something that might get an application upset—really rude events like system crashes occur when that happens.

Cool New Product Names

EVIL EMPIRE, BLUES BUSTER, ROADrunner, the Terminator. I'd like to see some nifty names. Something to get under the skin of the gang at Armonk. IBM got Apple's system code, Apple got IBM's dress code. Better fight that trend. Develop machines with way cool names. Names that no self-respecting Fortune 50 company could afford to put into its cubicles. The Destroyer 4000. The Attila the Mac trend in Apple's advertising is encouraging.

Hot Machines

I WANT NEW CPUS WITH TORQUE. Imagine hitting the start-up button and, after a bright flash of light and a growl from the internal speaker, the monitor quakes on its stand. You touch the keyboard and the monitor tilts a little, then it kind of shakes gently until you print anything with PostScript—then flames spit out of the sides.

Maybe a flame-licked Mac isn't in the cards. But I hope to see some of the items on my wish list some day soon. m

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MacWeek, February 1991

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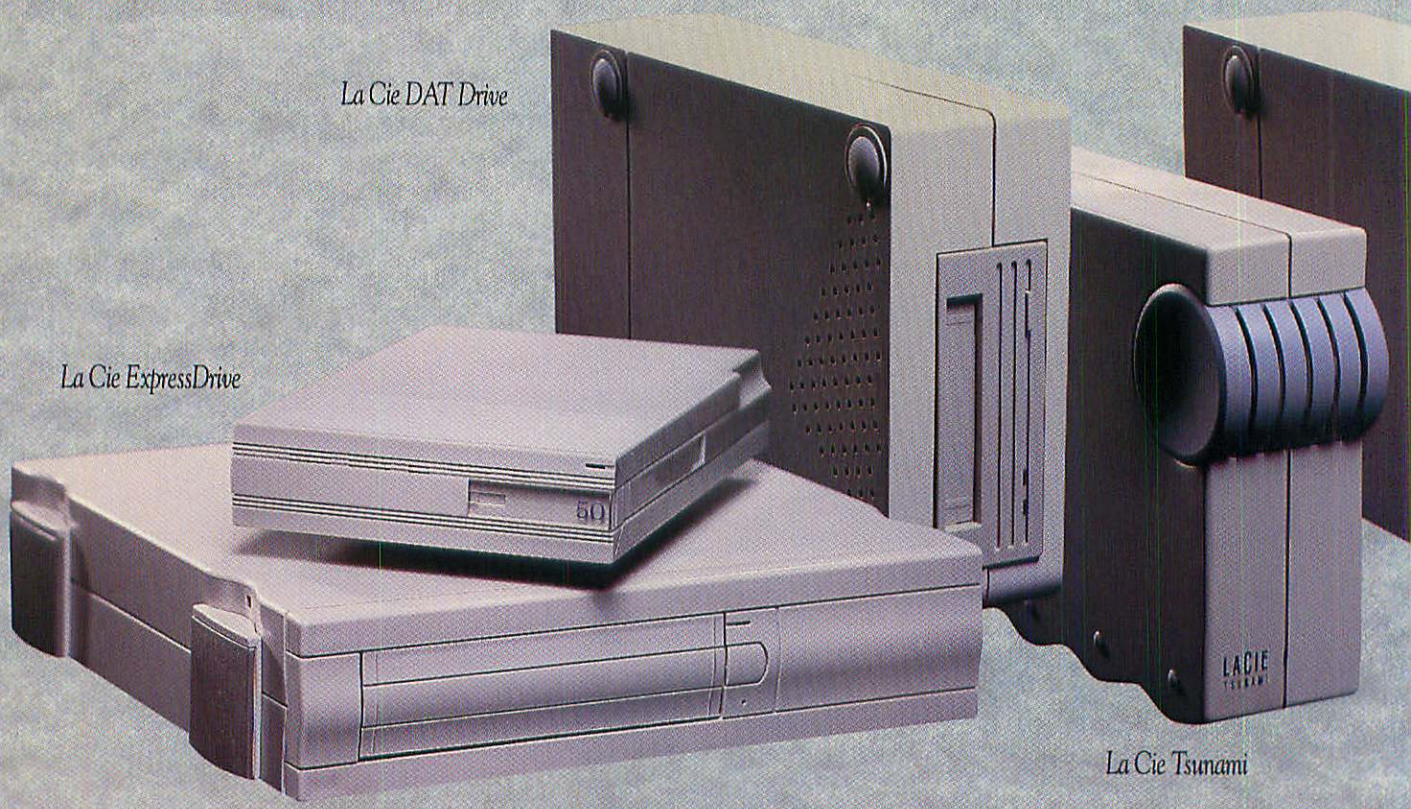
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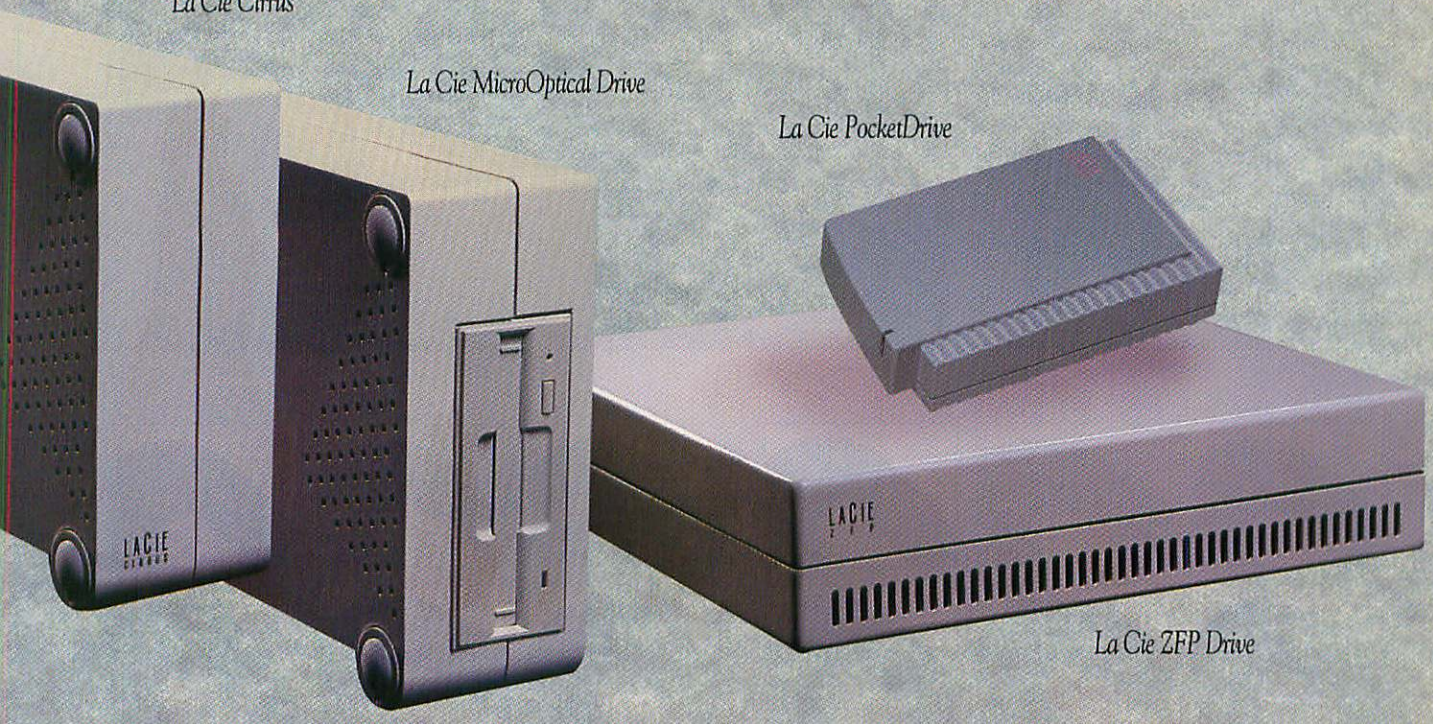
We love all our drives, but take a look at our newest arrival. La Cie's new ExpressDrive.™ Perfect for sensitive installations, the ExpressDrive is empowered with the performance of a Quantum fixed drive and the security and convenience of a removable drive, yet none of the risks of open-air media.

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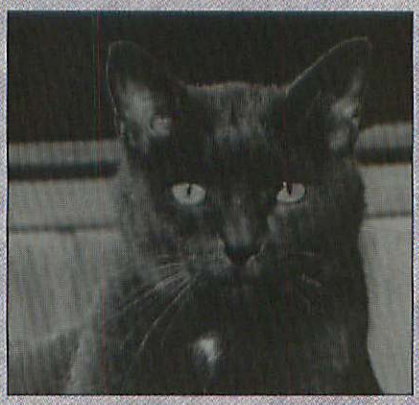
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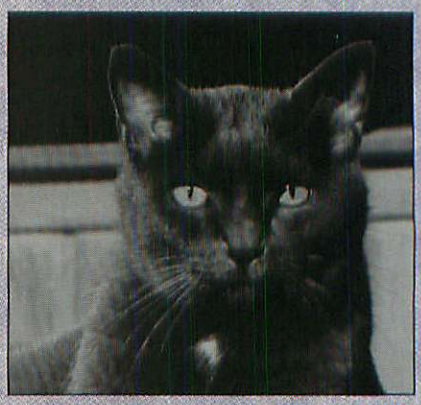
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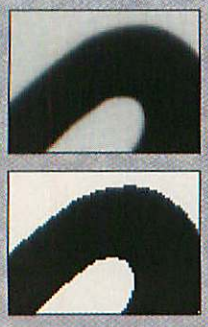
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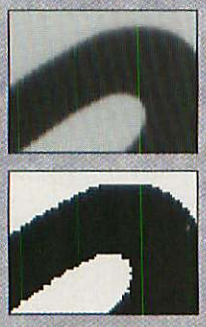
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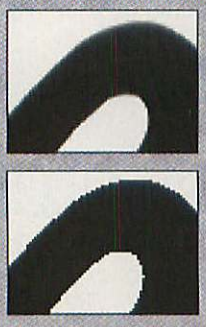
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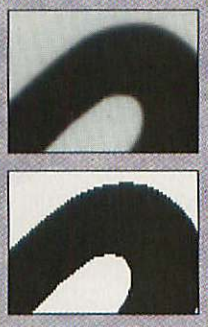
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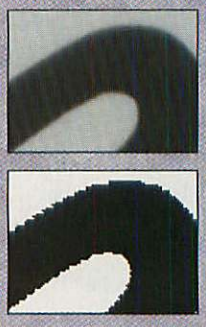
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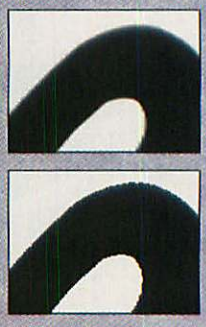
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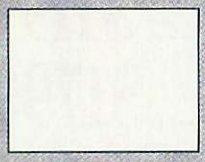
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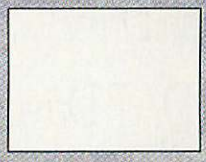
Howtek Scanmaster 3 $8195**



La Cie Silverscanner $1,399



Microtek 600ZS
1200 dpi at 400%—n/a



Howtek Scanmaster 3
1200 dpi at 400%—n/a

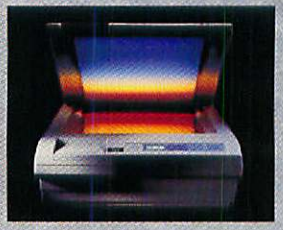


La Cie Silverscanner
1200 dpi at 400%



La Cie Silverscanner
1200 dpi at 100%

All scans were done at default settings with no corrections. The color images were separated using Adobe Photoshop. The logo was scanned as grayscale and as line art. This entire ad was done on the Macintosh using Silverscanner, Photoshop, Quark XPress and a PostScript Imagesetter. The entire production cost was $145.



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Letters

MARCH 1992

Powerful Notebooks

MACINTOSH POWERBOOKS: 100, 140, and 170" (December 1991) sounded like it was written by a small child who had waited and waited for his new toy, only to be slightly disappointed by the final results. Unlike in the dream world of *Macworld* computer labs, we working stiffs do not have access to all the new 040 chips and accelerators. The introduction of machines such as the PowerBooks 140 and 170 was a godsend to us.

The bleak tone of this article dimmed my excitement over this great advancement in the world of the Mac, and I did not appreciate that, since I too am waiting for my new toy, and have great expectations of it.

Glenn Mills
Cleveland, Ohio

I READ YOUR REVIEWS OF THE PowerBook and Outbound notebook computers (*Reviews*, December 1991) with great interest. It appears the writers prefer pointing devices they already know. Being left-handed, I found the TrackBar on the Outbound rather easy to use. I was also curious about the comparison of the prices. In fact, the Outbound is nearly as fast as the similarly equipped PowerBook 170 and costs less.

Seth Cohen
New York, New York

Slow, but Cheap

IN RESPONSE TO STEVEN LEVY'S column on the StyleWriter (*The Iconoclast*, December 1991), while I would disagree with nothing he said (Lord, Lord, it is a slow machine!), I'm getting a little tired of the assumption that it is always possible to find $500 more to spend on a printer.

Melissa Scott
Portsmouth, New Hampshire

WHEN YOU'RE TYPICALLY printing fewer than ten pages at a time for a school report or even a university lab report, this printer will produce laser printer quality at less than half the price—and when you're a student every penny counts, while time is not as expensive a commodity.

Jeff Lewis
via America Online

I TOO AM A FRUSTRATED USER OF the StyleWriter. For the past two years, we have used a Hewlett-Packard DeskWriter. The DeskWriter's ability to do shading and quick printouts were expected but not found in our new StyleWriter. We were also shaken by the higher cost of ink cartridges.

Duane Wince
Cedar Falls, Iowa

WHO CARES IF IT ISN'T FAST? It is trustworthy, loyal, helpful, friendly, clever, light, portable, cheap, and phenomenal. Shame, Steven Levy. Bravo, Apple.

Christopher DeSantis
Salt Lake City, Utah

CAD Conundrum

WHILE YOU'VE MOST ELOquently addressed the problem at the high end of CAD/CAM (*Commentary*, December 1991), the situation is the same at the low end. The high-muckety-mucks at Apple don't seem to be able to get a grip on the actual wants and needs of many market niches. Wonderful new hardware is useless if we can't find the software solutions that match.

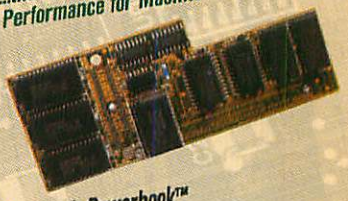
Michael Simpson
Red Bank, New Jersey

JERRY BORRELL DISCUSSED WHY the computer-aided design environment has not taken off for the Mac-

continues

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CORRECTIONS

A Macintosh Plus logic board was shown next to Classic and Classic II logic boards ("Macintosh Classic II: Improving on a Theme," December 1991).

Olav Martin Kvern wrote Real World FreeHand *(*Insights, *January 1992).*

intosh as it has for the DOS world. The answer is simple: More than 20 years of programming experience in this area of computing on the IBM means there is more sophisticated design software available in the PC than in the Macintosh environment, since there has been more time to build on the IBM PC platform.

As a sidelight, each seasoned engineer I know agrees to one thing: the Macintosh has a better operating system, hands down.

Joseph Bianchi
Conway, Massachusetts

THE COMMENTARY ON THE state of Macintosh CAD is severely flawed. Mac CAD is successful and growing rapidly. According to market research conducted by our publication, the value to developers of Macintosh-based CAD software shipped in 1990 reached $55 million on a volume of over 62,000 units. Furthermore, the Mac is becoming a major factor in the architectural segment of the CAD market, where it enjoys almost a 20 percent share of current shipments. The Mac's impact on architectural CAD and in other application areas would be entirely lost on a mechanical CAD/CAM user.

David L. Peltz, Publisher & Editor
Neil Kleinman, Editor in Chief
Macintosh Engineering and Scientific Report

C'mon, It's Just VR

VIRTUAL REALITY TECHNOLOGY is "only polygons" now (*The Iconoclast*, November 1991), but I still believe, like Mr. Levy, that it contains great potential. I'm sure that somebody said to the inventor of the wheel, "C'mon . . . it's just a circle."

Tom Igoe
Somerville, Massachusetts

THE PROMISE OF VIRTUAL SEX and *Total Recall*–like experiences is misleading, of course, but coupled with the delivery of funny headsets with very crude computer models, it is also threatening to alienate the general public, who already think that virtual reality is just an expensive and ultimately irrelevant form of entertainment.

More modest, screen-based simulations will probably continue to be used long after realistic, immersion-type VR systems have been developed.

Jonathan Stoppi
London, England

IT'S EASY TO POINT OUT HYPE and ridicule those whose excitement outpaces technology's ability to integrate components and evolve realistic markets. It's much more positive to point out the relationships between information and perception. Virtual reality and other interactional sciences attempt to discover these relationships and provide tools that will allow us to use them for our mind's benefit.

Jim Leftwich
Palo Alto, California

LEVY IS RIGHT ABOUT THE ratio of hype to hardware. A risk is that the general public may get sold on VR ideas that won't be deliverable for a long time yet.

Derek Lowe
Cedar Grove, New Jersey

Christmas Cheer

I ENJOYED "FOR THE MAC THAT Has Everything" (December 1991). This zany collection of mutant graphics almost makes me want to go to 24-bit color so I can perform similar transmogrifications.

The review of the About Cows CD (*Reviews*, December 1991) by Erfert Fenton (I believe the name of a 1940's Chrysler station wagon with plaid interior, the Fabulous Chrysler Windsor Erfert Fenton Town and Country Wagon) was quite amusing as well. I prefer my bovinity in small patties or steaks, though.

Scott Hogensen
Roy, Utah

We Like Liz

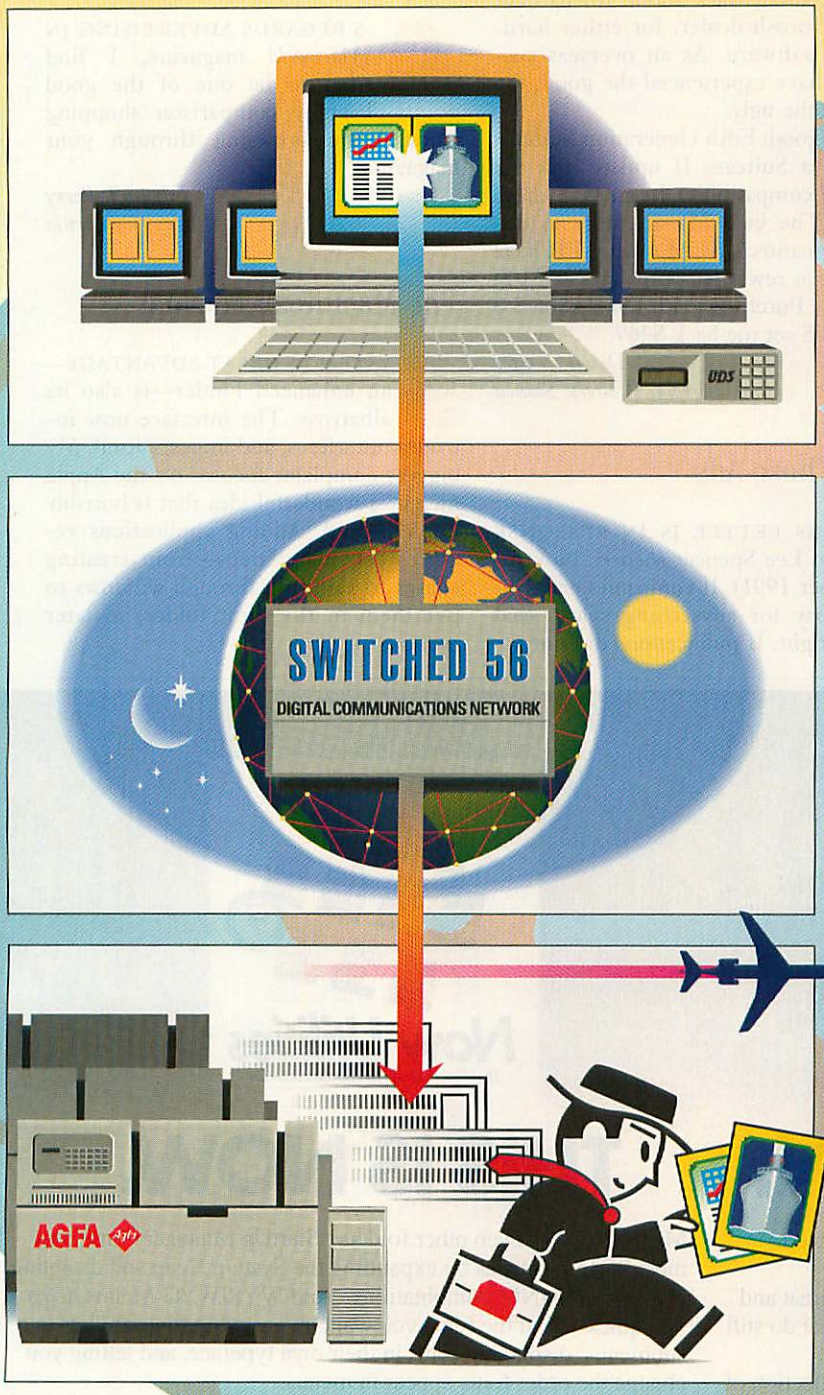
DAVID POGUE'S CRITICISM OF Personal Training Systems' self-paced audio tutorials was unbalanced and misleading (*The Desktop Critic*, December 1991). We too poke fun at Liz occasionally, but her friendly voice and carefully worded scripts are far from pa-

continues

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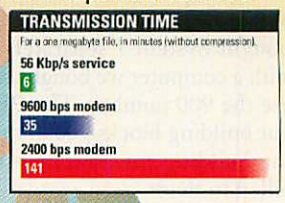
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John Holland
Vice President, MacPeople
Berkeley, California

900-Support Agony

WE HAVE A SERIOUS PROBLEM with System 7. I called one of the dealers we buy from. His comment was that Apple reps had told him not to answer questions on System 7 because Apple had a hotline, which is an 800 number you can use only if you bought System 7 separately. Ours came with a computer we bought, so we have to use the 900 number. The PBX system in our building blocks 900 numbers because the building managers say the calls are billed to them.

Would you please point out the stupidity of the 900 support number and the rigidity of Apple when faced by a problem like ours. If service is the name of the game, they lost.

Robert Cavanaugh
Herndon, Virginia

In Western Samoa

I READ WITH INTEREST AND EMpathy the letter from Ward E. Whitley of Saudia Arabia (*Letters*, October 1991). The country that I am writing from is too small (population 160,000, total Macs about 30) to have any Macintosh dealer, for either hardware or software. As an overseas customer I have experienced the good, the bad, and the ugly.

The good: Fifth Generation Systems sent me a Suitcase II update disk for System 7 compatibility, by air mail, at no charge. The bad: My attempts to upgrade Symantec's SUM to SUM II have so far been rewarded with only SAM 2. The ugly: Purchasing 4th Dimension 2.0 by ACIUS set me back $469.

Donald Telfer
Apia, Western Samoa

Love Those Ads

THIS LETTER IS IN RESPONSE to Lee Spencer (*Letters*, November 1991). If companies are willing to pay for advertising space, that is their right. If publications did not accept ads, the only way to meet their costs would be either to raise prices on their readers or simply to print fewer articles—in either case, that would be a mistake.

Regan Jon Gong
San Francisco, California

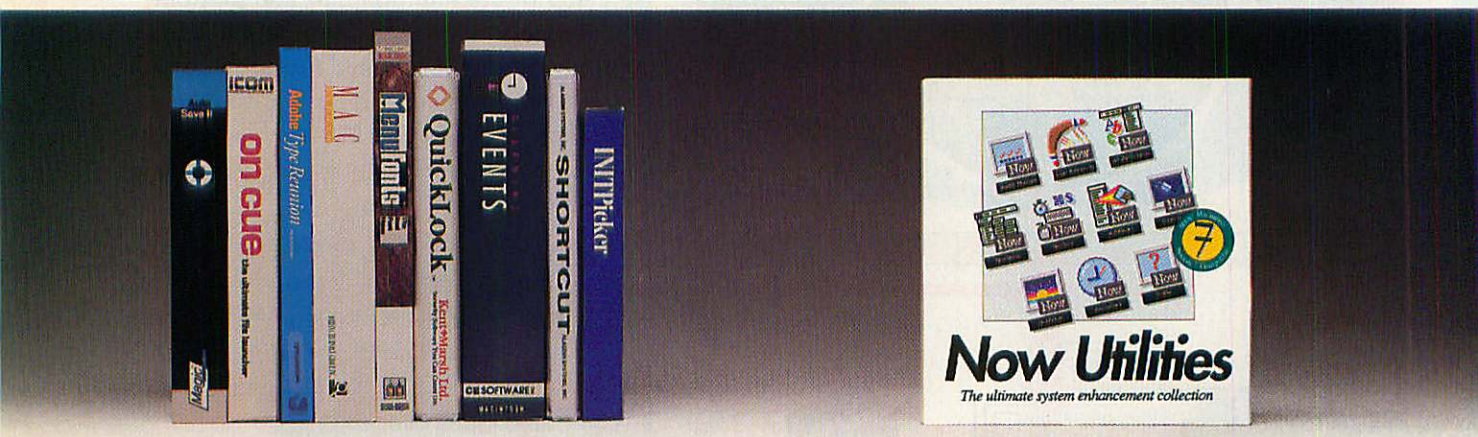
AS REGARDS ADVERTISING IN *Macworld* magazine, I find that to be one of the good points. I enjoy comparison shopping while I am browsing through your magazine.

Edwin J. Perry
Albany, California

The Macintosh Mariner

SYSTEM 7'S GREAT ADVANTAGE—an enhanced Finder—is also its albatross. The interface now intrudes, interferes, and imposes itself. My biggest complaint focuses on the Apple menu—a wonderful idea that is horribly implemented. Adding applications requires too many steps—from creating aliases to shuffling through windows to put them in the right folder, to later

continues



THAT WAS THEN. THIS IS NOW.

Over the years, a lot of great utilities have been created to make the Macintosh even easier and more useful.

Now, however, there's System 7, and a lot of once great and useful utilities no longer work. And many of the ones that do still work no longer seem very great...or very useful.

Which is why we created Now Utilities 3.0 — a collection of 10 utilities that will do for System 7 what products like On-Cue and Adobe Type Reunion did for System 6...only more so. As *MacUser* put it, "Now Utilities will make your Macintosh faster, easier, and more fun to use."

For example, Super Boomerang finds files by name or content, even if they've been compressed. NowMenus creates submenus up to 5 levels deep for anything you put in the Apple Menu folder — even other folders. StartUp Manager eliminates most System crashes by expanding the System Heap and disabling incompatible INIT combinations. And WYSIWYG Menus helps you quickly find the fonts you want by grouping font families into submenus, displaying fonts in their own typeface, and letting you change the order fonts appear in menus.

In fact, everything in the collection is the leader in its category. Just as importantly, everything in the collection is guaranteed to work together, and with anything else you may have...even System 6.

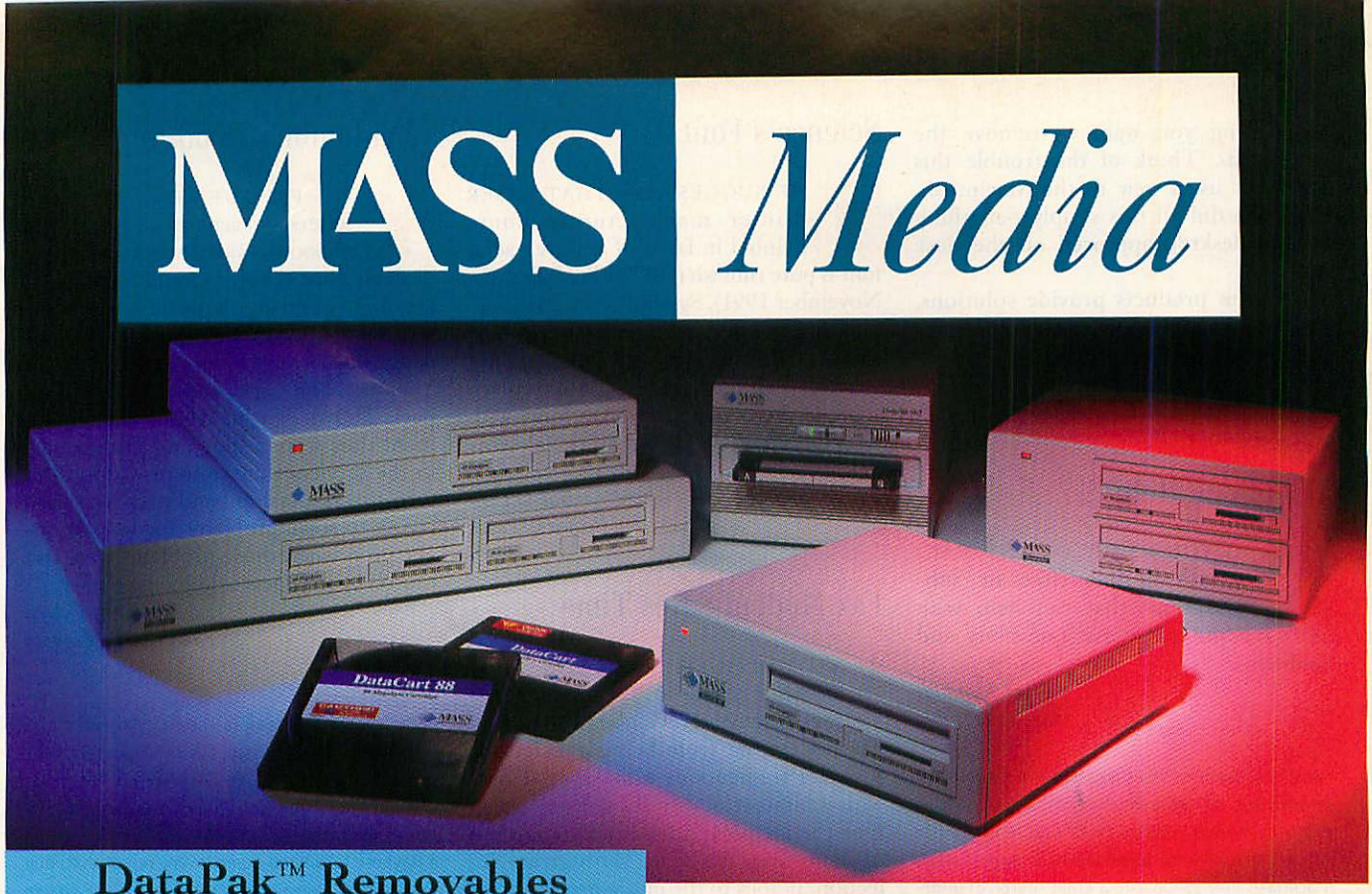
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SyQuest

discovering you want to remove the word *alias*. Think of the trouble this poses for users new to the Macintosh. The Lisa did all this simply—anything on the desktop appeared on the desk menu.

Add-in products provide solutions, but why should you have to hunt for or buy something else?

Lawrence C. Stedman
Binghamton, New York

Telephone Help

DO YOU KNOW OF ANY MACintosh hotline (free or subscription) that can help with software and hardware questions and problems?

Aziz Ucmakli
Marysville, Ohio

See the September 1991 *Conspicuous Consumer* for information on independent companies, such as Kirin's Computer Helpline (900/446-2648, $2 per minute), that offer fee-based technical support. Also, Macintosh user groups are a great source of information. To find the user group nearest you, call Apple's User Group Connection at 800/538-9696 ext. 500 or 408/996-1010.—Ed.

Science's Font

THE SUGGESTION THAT LASER printer manufacturers dump Symbol in favor of a more useful font is pure rubbish ("BLP Elite," *Reviews*, November 1991). Symbol is absolutely essential for most documents in science and engineering. Instead of dropping symbol, manufacturers should replace some of the redundant roman fonts with Cyrillic, Hebrew, or an additional symbol font.

Bill Wilson
Bellaire, Texas

Fax Modem Saves Time

I MUST DISAGREE WITH THE WRITer who refers to fax modems as toys (*Letters*, November 1991). My fax modem, far from being a gadget or toy, is a tremendous time-saver. I deal with a number of offices, and now I can type the memo and send it to one or all of them from my Mac. With group selection, it goes to the entire group at one command.

Dave Pardoe
Columbia, Maryland

Washington's Good Apple

YOU FREQUENTLY PUBLISH letters and articles that complain of poor service provided by Apple dealers. Your readers should know there are some good Apple dealers. Over the last eight years, I've purchased four computers from Computer Products of Yakima. The salespeople have always been knowledgeable about the equipment they were selling and professional in the services they were providing. I've seen this dealership bend over backward trying to solve problems for its customers, even when those problems were not caused by products sold by the dealer.

Blaine Gibson
Yakima, Washington

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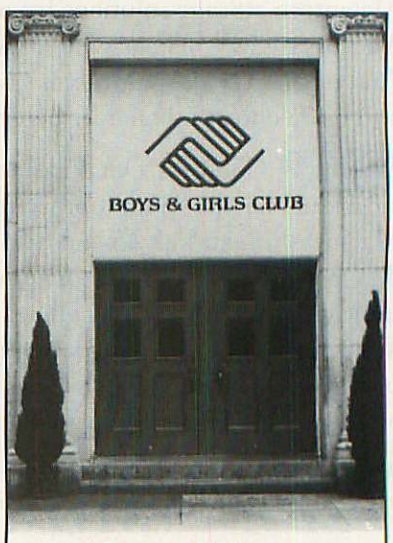


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(designers' names withheld to avoid further unjust persecution)

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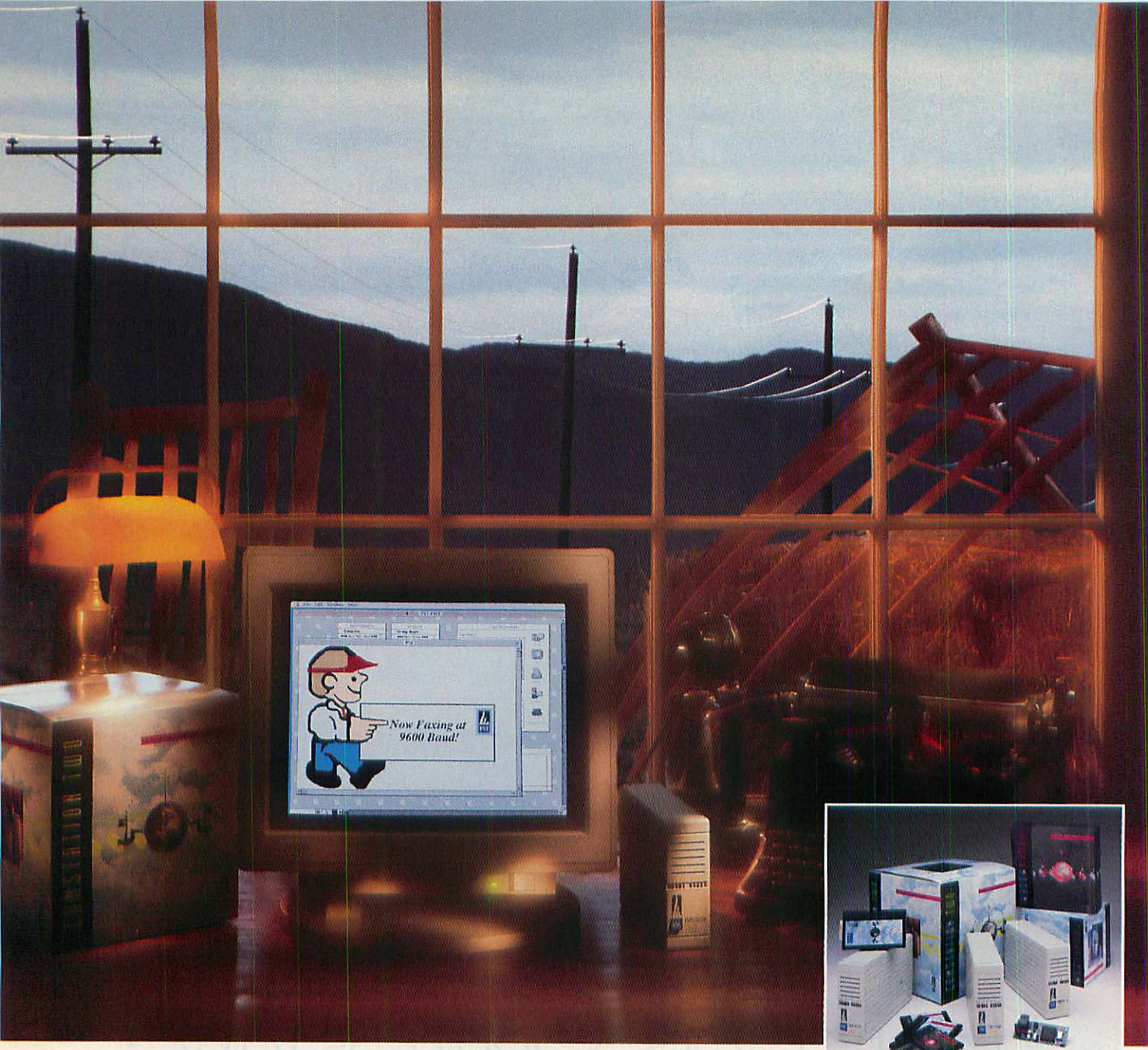
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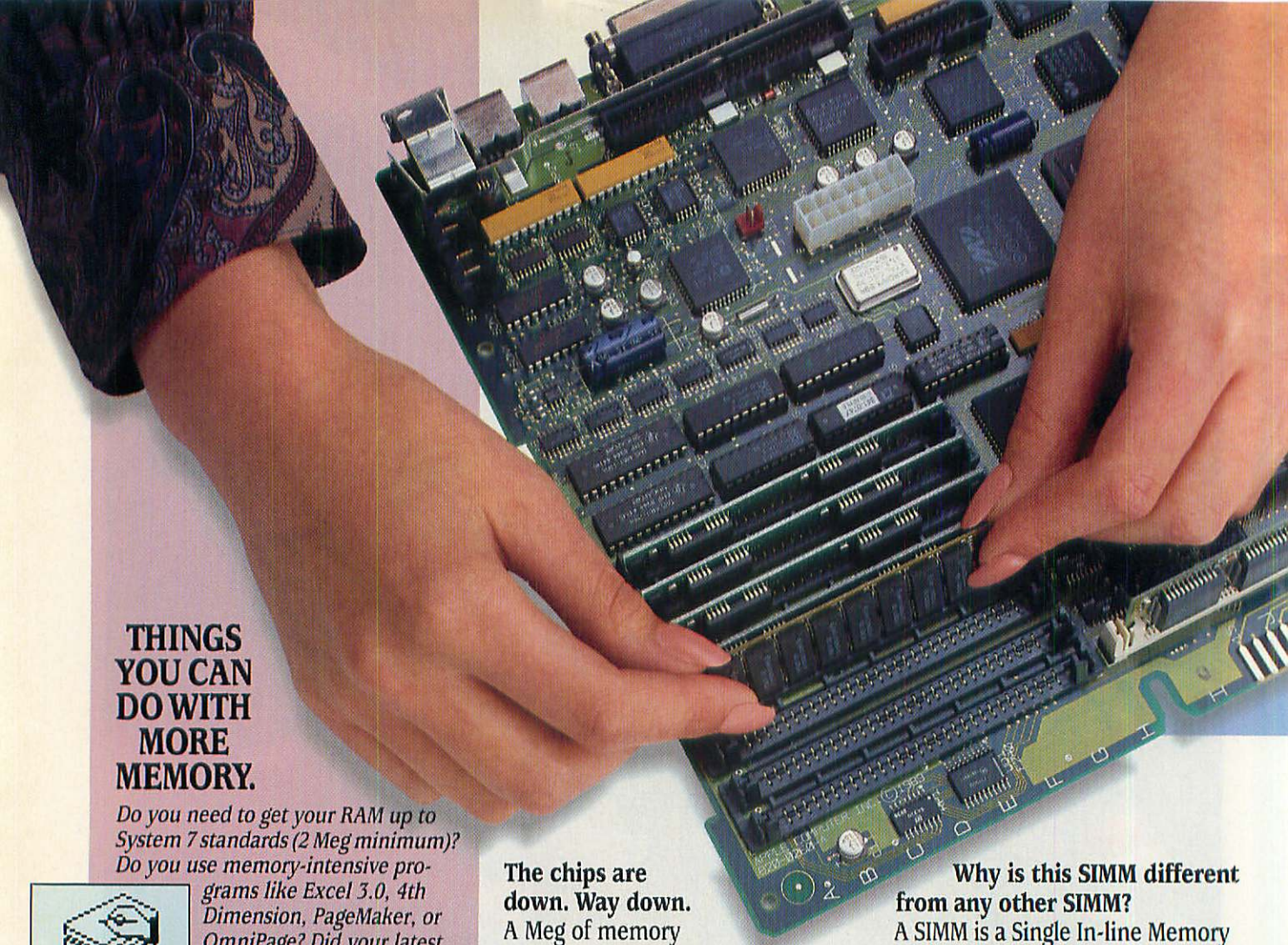
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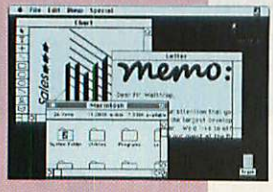
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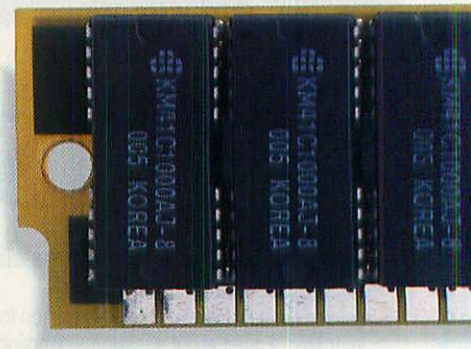




The chips are down. Way down.
A Meg of memory used to cost more than a spare screw from the Pentagon. But now SIMMs have become a commodity—the more we buy, the better price we can pass along to you.

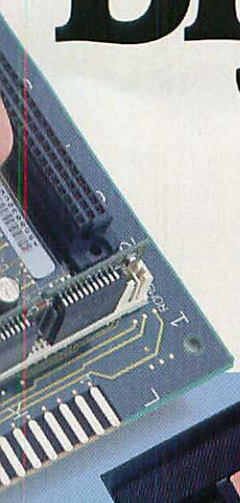
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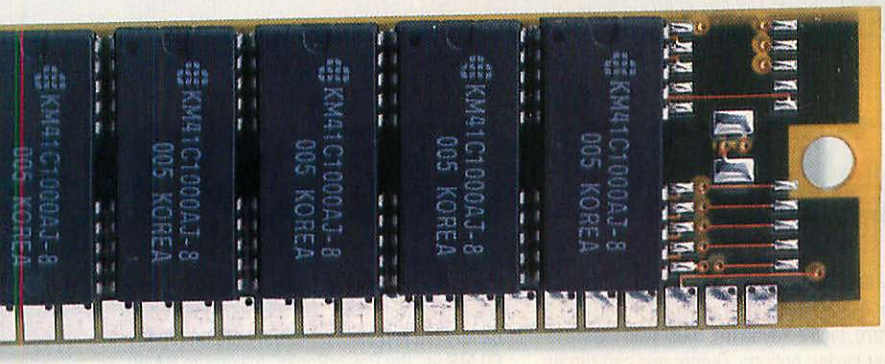
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*Most manufacturers (including Apple) get a little nervous about non-authorized personnel (that means you) working inside their machines. Be advised that opening your Mac may void the warranty, so check with your dealer if you're concerned.

Prices subject to change without notice.

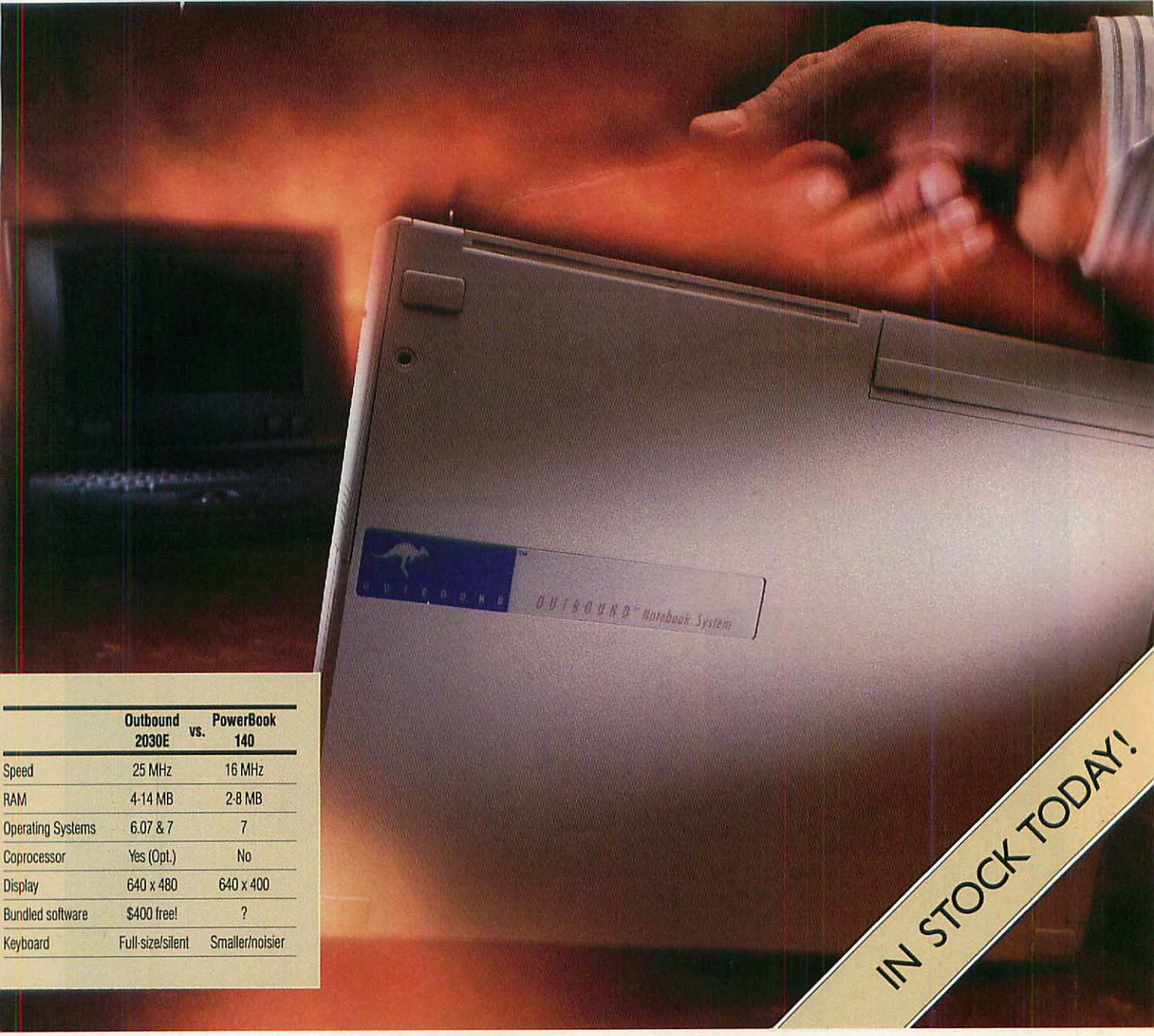


	Outbound 2030S	vs.	PowerBook 170
Speed	33 MHz		25 MHz
RAM	4-14 MB		4-8 MB
Operating Systems	6.07 & 7		7
Coprocessor	Yes (Opt.)		Yes
Display	640 x 480		640 x 400
Bundled software	$400 free!		?
Keyboard	Full-size/silent		Smaller/noisier

Outbound outshin

Comparing Apples to Outbounds.
Before you bite the retail bullet for an Apple PowerBook, check out **Outbound Notebook Systems**. Says who? Says *Macworld* (1/91): "Outbound's notebooks are solid machines and deserve serious consideration by anyone contemplating buying a Mac notebook." They use true Mac ROMs for System 7 and 6.07 compatibility and feature higher resolution, a fast, responsive TrackBar for cursor control, and a full-size, tactile keyboard. Plus, with their power-saving options, Outbounds can run up to 3 hours on a single charge of a standard Camcorder battery.

With processor speeds from 25-33 MHz, Outbounds run faster than comparable PowerBooks. They also offer 4-14 MB of RAM (vs. the PowerBooks' 4-8 MB) along with a battery-backed silicon memory option (up to 60 MB vs. the PowerBooks' maximum 6 MB) so you can handle the biggest applications and multitasking. And all Outbounds weigh in at just 6.25 pounds and measure 8.5″ x 11″ x 2.1″—smaller and lighter than the PowerBooks.



	Outbound 2030E	vs.	PowerBook 140
Speed	25 MHz		16 MHz
RAM	4-14 MB		2-8 MB
Operating Systems	6.07 & 7		7
Coprocessor	Yes (Opt.)		No
Display	640 x 480		640 x 400
Bundled software	$400 free!		?
Keyboard	Full-size/silent		Smaller/noisier

es the PowerBook.

You won't outgrow your Outbound.
Unlike the PowerBooks, Outbound Notebooks are upgradable. Start with the EC030 and move up to the 030 or even more powerful processors as they become available; increase RAM with standard DRAM SIMMs instead of expensive Apple RAM; add a math coprocessor; or move up to an 80 MB hard drive or even higher.

Plus we make the deal even better with over $400 of free software including *GreatWorks*, *Norton Utilities*, *S.A.M*, *Easy Alarms*, *Glider* and *Star Trek Sounds*. So before you buy just any notebook, give the Outbound a real good look—then give us a call. By the way, MacConnection is the exclusive mail-order source for Outbound Notebook Systems.

2161	2030E/440 *(68EC030, 4MB, 40HD)*	**$2799.**
2147	2030E/442 *(same w/math copro.)*	**2899.**
2110	2030E/460 *(68EC030, 4MB, 60HD)*	**2899.**
2109	2030E/462 *(same w/math copro.)*	**2999.**
2108	2030S/440 *(68030, 4MB, 40HD)*	**3199.**
2107	2030S/442 *(same w/math copro.)*	**3299.**
2106	2030S/460 *(68030, 4MB, 60HD)*	**3399.**
2105	2030S/462 *(same w/math copro.)*	**3499.**

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See DOS run.

5 ways to do the DOS thing.

No hardware modification or manipulation required! **Universal SoftPC** emulates a PC/AT and is recommended for text-based applications. **SoftAT** adds EGA graphics, a math coprocessor, and expanded memory for heavy-duty number crunching and graphics. Add **SoftNode** to either one and share DOS applications with your colleagues over a Novell network. For low-cost or portable Macs, **Entry Level SoftPC** meets the same specs as the Universal, except for SoftNode compatibility.

To mount, view, and manage DOS files on Macs, get **AccessPC**—it has drivers for floppies, removable cartridge, and magneto-optical drives. So DOS to the Macs with Insignia Solutions!

Insignia Solutions

4089	❼ Universal SoftPC 2.5	**$195.**
3229	❼ SoftAT 2.5	**299.**
3441	❼ SoftNode 1.0	**105.**
3454	❼ SoftNode 1.0 *(10 Pak)*	**699.**
9726	❼ Entry Level SoftPC 2.5	**125.**
7557	❼ AccessPC 1.1	**60.**



The Dove speaks.

Fax, modem, *and* voice messaging!
Give your Mac total control of your telecommunications with the *Macworld* World-Class-Award-winning **DoveFax Desktop**. The combination 2400 bps Hayes-compatible data modem and 9600 bps fax modem lets you manage all your daily communications from the privacy (and convenience) of your computer.

Send and receive in the background, create custom cover pages, log fax activity, and get notified when messages arrive. **DoveFax Plus** adds Mac-based voice messaging software so your Mac can also serve as an answering machine complete with personalized greetings. Both models are also available in internal versions for NuBus systems. **DoveFax LAN** allows networked users to share communications capabilities over a single phone line.

Dove Computer

6758 ❼DoveFax Desktop 2.0 ..... **$269.**
3352 ❼DoveFax NuBus ..... **329.**
9634 ❼DoveFax Plus **349.** 4111 NuBus **399.**
4110 ❼DoveFax LAN **499.** 4109 NuBus **529.**

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MacConnection®

When it's something

The original mail-order source for Macintosh products. Since 1984. 1991 Macworld World Class Award Nominee for Best Customer Support-Software.

System 7 Video: Featuring *Macworld* Contributing Editor Lon Poole. *Free* when you order Apple's System 7 for $99 (1074). Or, just $9 (2244). We also have Lon's *Macworld Guide to System 7* for $19 (2238).

Products preceded by ❼ are compatible with **System 7**. For *specific features* of System 7, please ask your salesperson when placing your order.

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We carry only the very **latest versions** of products. For products or versions not yet released at press time we've indicated the expected availability dates as supplied to us by the manufacturers. Also, all software is not copy-protected, unless indicated otherwise by *(CP)*.

Corporate Accounts welcome. Bids and P.O.'s accepted. Please call 800/800-3333 for information.

COMPUTERS

MacConnection is the exclusive mail-order reseller for Outbound Notebook Systems.

Outbound Systems, Inc.
Full line available. All include a 1.4 Floppy Drive, a slip case, power supply & a limited time special software bundle offer.

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4174 ❼Outbound Notebook 2030/461 *(same as 2030/460, incl. math copro)* . 3549.



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8059 ❼ *MacInTax Personal Ed. 1991*—America's best selling tax software for the Mac. 1991 *Macworld* World Class Award winner and 1991 *MacUser*'s Editors' Choice Award Nominee $59.
❼ *MacInTax Personal States 1991* . . . . . ea. 42.

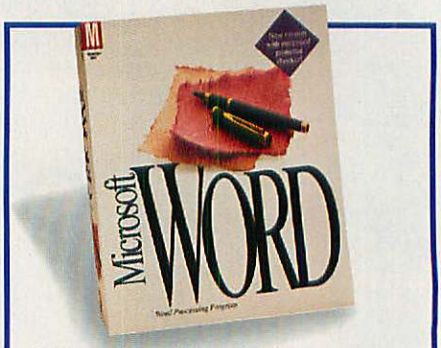
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3606 ❼ *1-2-3 for the Mac*—Takes full advantage of the Mac. Directly manipulate & format all data, text, & graphics. Offers true 3D worksheets & Excel & 1-2-3 file compatibility $349.
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Fox Software
5572 ❼FoxBASE+/Mac 2.01 . . . . . 289.



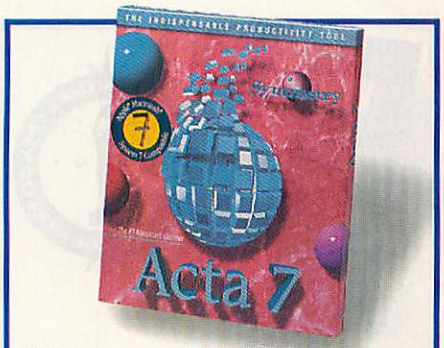
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4902 ❼ *Word 5.0*—New features include an integrated grammar checker, Drag-and-Drop text, and a new Print Merge Helper. Whether you're a beginner or an expert, Word offers all the tools you need to make everyday easier . . . . . $299.

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Informix
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2884 ❼Works 2.00E. . . . . 159.
9803 ❼Excel 3.0 . . . . . 309.
1420 ❼Excel 3.0 Companion Book . . . . . 20.



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for Mac you're after,



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5454 ❼The Microsoft Office 1.5 ..... 479.

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Paragon Concepts

5683 ❼Nisus 3.06 ..... 245.

★Portfolio Systems ... 30 day MBG

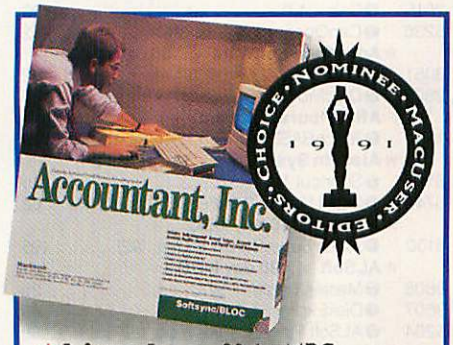
7992 ❼DynoPage or 6916 ❼Dynodex ... *ea.* 72.

★PowerUp ... 30 day MBG

7696 ❼Calendar Creator 1.01 ..... 44.
7694 ❼Address Book Plus 2.0. ..... 63.
7698 ❼Fast Forms 2.0 ..... 112.

★Provue ... 60 day MBG

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★Softsync, Inc. ... 30 day MBG

7129 ❼ *Accountant, Inc. 2.1.2*–1991 *MacUser*'s Editors' Choice Award Nominee. "The most complete integrated accounting and financial management package," *MacUser* (3/91). . $339.
3828 ❼ *Accountant, Inc./MultiUser 1.0*..... 739.

★Que Corp. ... 30 day MBG

7482 ❼RightWriter for the Mac 3.1 ..... $54.

★Reality Technologies ... 30 day MBG

6929 ❼WealthBuilder 1.02. ..... 95.

★Reference Software ... 30 day MBG

6268 ❼Grammatik Mac 2.0 ..... 58.

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9946 ❼LetterWorks, 9945 ❼LetterWorks Sales 1.0, or 9947 ❼LetterWorks Legal 1.0. . . . *ea.* 45.

★Shana ... 30 day MBG

8810 ❼Informed Manager 1.2 ..... 99.
7692 ❼Informed Designer 1.2 ..... 159.

★SoftStream ... 30 day MBG

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★Symantec ... 30 day MBG

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3422 ❼More 3.1. ..... 265.

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2986 ❼Timeslips III 2.1. ..... 194.
8939 ❼Accounting Link 1.0B. ..... 52.

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3507 ❼Aldus Super 3D 2.5 ..... 325.
7467 ❼Aldus PrePrint 1.51. ..... 325.
4751 ❼Aldus Persuasion 2.0 ..... 325.
1330 ❼Aldus FreeHand 3.1 *(Jan. '92)* ..... 395.
7088 ❼Aldus PageMaker 4.2 *(Jan. '92)* ..... 495.
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6644 ❼ *Adobe Photoshop 2.0*–1991 *MacUser*'s Editors' Choice Award Nominee for Best Image-Editing Program ..... $549.
4145 ❼ *Adobe Premiere 1.0*. ..... 309.
8171 ❼ *Adobe Illustrator 3.2 (w/ATM)* ..... 369.

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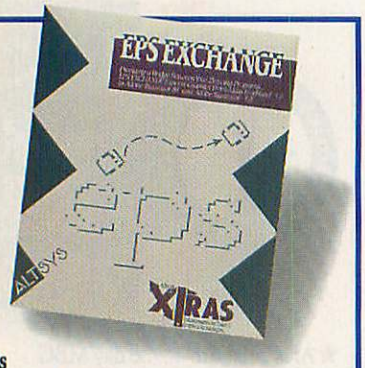
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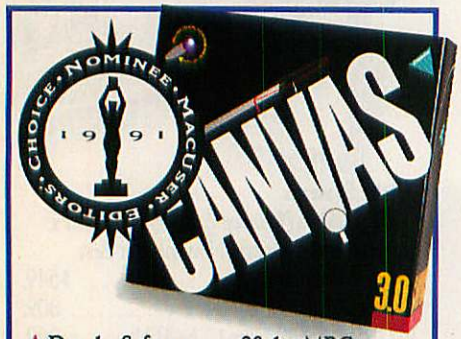
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★Casady & Greene ... 30 day MBG
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2417 ❼ MacDraft 2.1 . . . . . 279.
4707 ❼ Dreams 1.10 . . . . . *special* 349.
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2619 ❼ ImageStudio 1.5 . . . . . 139.
4709 ❼ LetraStudio 2.0 *(Jan. '92)* . . . . . 139.
6300 ❼ FontStudio 2.0 . . . . . 359.
6301 ❼ ColorStudio 1.5 . . . . . 599.
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2636 MacKanji 6.0.5 . . . . . 79.
2638 LaserCyrillic 1.0 . . . . . 99.
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3440 ❼ QuickPICS 1.0 . . . . . 103.
3148 ❼ Magic 1.0 . . . . . 275.
5028 ❼ ModelShop II 2.0 . . . . . 619.
❼ SwivelArt *(Map & Viewpoint art)* . . *ea.* 175.
7441 ❼ Swivel 3D Professional 2.0 . . . . . 479.
3450 ❼ SwivelMan 1.0 . . . . . 619.
★Mainstay ... 30 day MBG
9798 ❼ Capture 4.0 . . . . . 82.



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MaccessCard Reader combined with FileGuard 2.7 secures your Mac against unauthorized users.
7085 ❼ *FileGuard 2.7 (1 user)* . . . . . $139.
9440 *MaccessCard Reader (reqs. FileGuard)* . . 299.
9439 ❼ *MaccessCard/FileGuard (1) Bundle* . . 399.

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3013 ❼ Color It! 1.0 . . . . . 75.
7886 Enhance 2.0 . . . . . 235.
★MicroMaps ... 30 day MBG
7556 ❼ MapArt *(PICT)* or 7555 *(EPS)* . . . . . *ea.* 89.
★Microsoft ... 30 day MBG
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★SuperMac Technology ... 60 day MBG
3380 ❼ PixelPaint 2.1 . . 149. 5625 ❼ Pro . . 459.



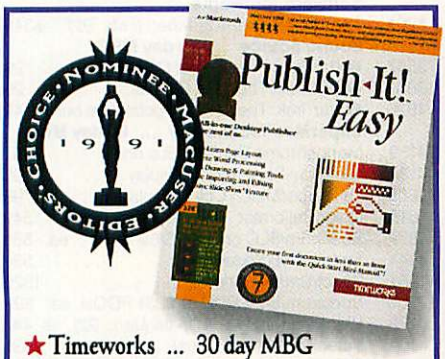
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1352 ❼ *TouchBASE 2.0*–Multi-user database designed to keep track of personal and business contacts. It's a handy desk accessory that can print envelopes, labels, address books, fax cover sheets, reports and much more. . . . . $79.

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5204 ❼ ALSoft Power Utilities *(Feb. '92)* . . . . . 69.
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3598 ❼Norton Utilities & SAM Bundle . . . . . 118.
3421 ❼THINK Pascal 165. 2688 ❼THINK C 199.
9957 ❼THINK Reference 1.0 . . . . . 69.

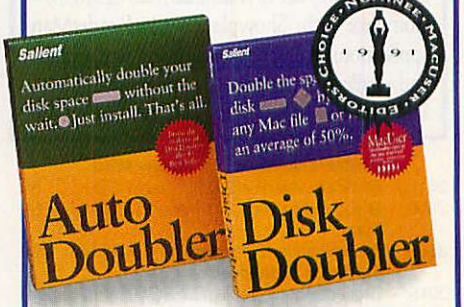


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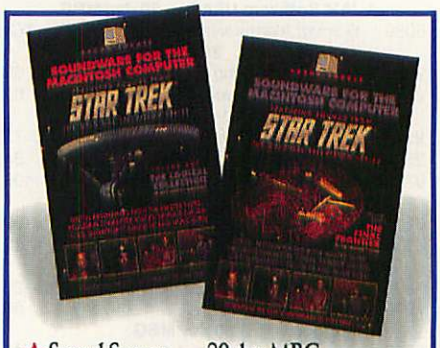


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3115 ❼MIDI Interface. . . . . 79.
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2244 System 7 Video with Lon Poole *(VHS)*. . . . . 9.
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1596 ❼ShowPlace & MacRenderMan Bundle 649.
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8526 Video Expander. . . . . 499.
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1844 Spectrum/8 Series III . . . . . 536.
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2330 Spectrum/8-24 PDQ or 2231 PDQsi *ea.* 899.
4122 VideoSpigot LC or 4114 IIsi *(Jan. '92) ea.* 447.
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9326 ❼Beethoven: Symphony No. 9 2.0. . . . . 65.
9327 ❼Stravinsky: The Rite of Spring 2.0 . . . . . 65.

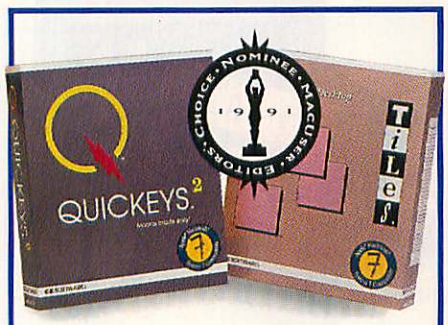


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3343 ❼ Aqua Blooper Piper 1.0 . . . . . 29.
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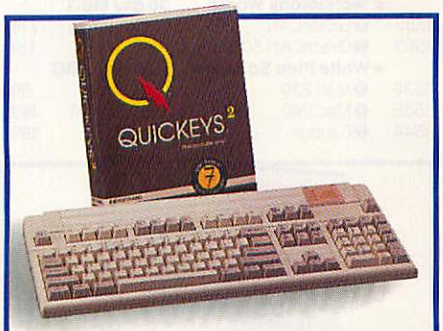
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6128 ❼ MathBlaster Mystery. . . . . 29.
2574 ❼ MathBlaster Plus . . . . . 35.
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7622 ❼ Darwin's Dilemma 2.0 *(Feb. '92)*. . . . . 31.
3414 ❼ Mutant Beach. . . . . 44.

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1894 ❼ BattleChess *(3D animation)* . . . . . 29.
3520 ❼ Dvorak on Typing *(Feb. '92)* . . . . . 29.
1893 ❼ CheckMate *(infinite play levels)* . . . . . 31.
3534 ❼ Castles 1.0 *(Feb. '92)* . . . . . 34.

★ Learning Company ... 30 day MBG

2670 ❼ Reader Rabbit 3.0 *(CP) (ages 4-7)* . . . . 34.
3272 ❼ Outnumbered 1.0. . . . . 34.
3281 ❼ The Writing Center 1.0 . . . . . 51.

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❼ Scenery Disks 1-4 Flight Simulator. *ea.* 30.

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3963 ❼ Oregon Trail 1.0 . . . . . 28.
3960 ❼ Number Munchers 1.2. . . . . 28.
3959 ❼ Word Munchers 1.2 . . . . . 28.
4095 ❼ Super Munchers 1.0. . . . . 28.

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❼ FreeHand 3.0 *(modules 1-5)* . . . . . *ea.* 62.
❼ HyperCard 1.0, 2.0 *(modules 1-4)* . *ea.* 62.
❼ PageMaker 4.0 *(modules 1-6)* . . . . *ea.* 62.
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2523 ❼ King's Quest V . . . . . 34.

Sir-Tech Software

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8229 ❼ Bane of Cosmic Forge . . . . . 35.

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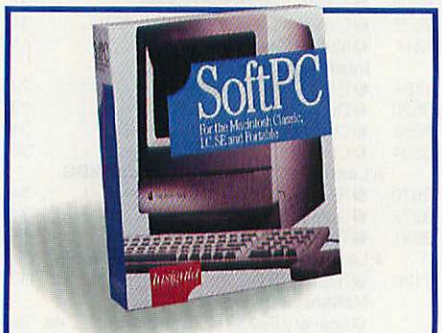
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3017 ❼Wordtris 1.0 *(Jan. '92)* . . . . . 25.
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3287 ❼Warlords *(empires at war) (Feb. '92)* . . . 31.
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1673 ❼CompuServe Navigator 3.04 . . . . . 49.
1674 ❼Membership Kit/Navigator Bundle . . . . 72.
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1823 ❼MacLink Plus/PC 6.0 . . . . . 129.
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6273 PhoneNET StarConnector 10-Pack . . . . 129.
4869 PhoneNET Connector 10-Pk *(DIN8)* . . . . 198.
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5327 ❼TelePort/Full FAX. . . . . 219.
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Hayes
2300 ❼Smartcom II for the Mac 3.3 . . . . . 84.
8614 Personal Modem 2400 Plus . . . . . 149.
3522 OPTIMA 96 Modem . . . . . 479.
7391 ULTRA 96 Modem . . . . . 669.



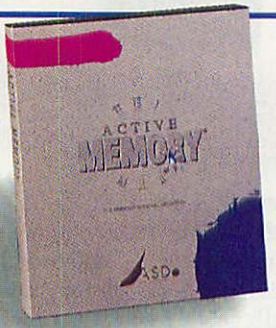
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7934 PM9600SA Modem 1.26 . . . . . 469.
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3232 ❼ProModem 24/96 S/R Minifax Plus. . . 269.
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Sitka/TOPS
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6264 ❼TOPS Network 3.1 . . . . . 187.
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1982 ❼Scanmaker 1850S . . . . . 2299.
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8008 ❼PowerKey Remote . . . . . 32.

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3107 ❼LightningScan Pro 256. . . . . 519.



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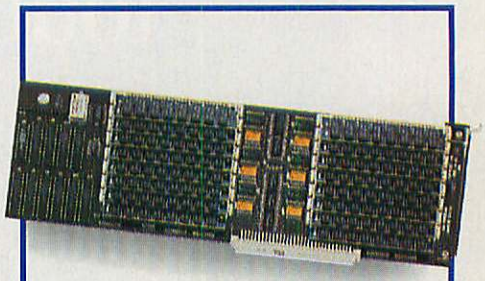
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4850 FastMath Classic II . . . . . 169.
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2466 ❼Mac 2B Interface *(w/Retrospect)* . . . . . 99.

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4103 DataPak MO . . . . . 2899.
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8327 PLI Infinity 40 Turbo *(removable)* ..... 699.
9752 PLI Infinity 88 Turbo ..... 849.
2644 Quantum 52 MB External ..... 479.
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8329 PLI 200 MB ..... 989.
2327 PLI 2GB DAT Drive ..... 1939.
2325 PLI Infinity Optical Drive ..... 3199.
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3137 Crunch-It! LC ..... 113.

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1501 DoubleUp with ❼DiskDoubler 3.7 ..... 179.

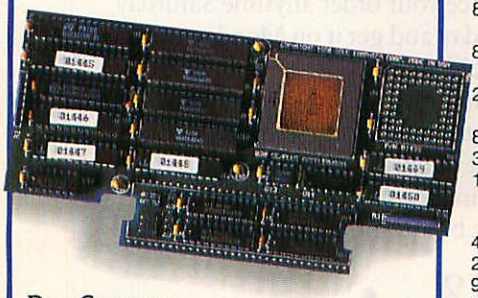
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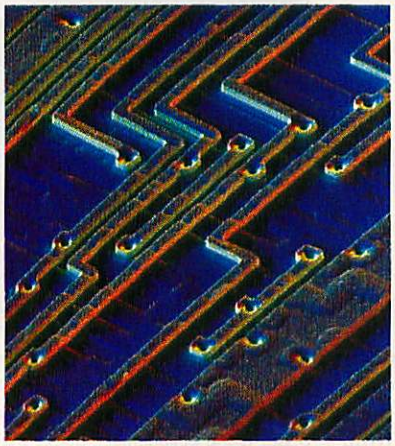
Art Beat

Behind Macworld's Graphics

BY CATHY ABES

Artist: Los Angeles–based David Scharf is a free-lance artist and photographer whose photos and illustrations have appeared in textbooks, encyclopedias, magazines, and on television. He is also a scientist and electronic engineer who recently invented a method of colorizing photos taken with scanning electron microscopes, and outputting them as Macintosh files.

While working at a physics lab in 1973, Scharf taught himself to use the scanning electron microscope, or SEM. Scanning electron microscopy is used extensively in scientific photography for low to very high magnification levels; from the macro range (as low as 4 times the original size) all the way to the submicron range (as high as 100,000 times).



A section of the data memory controller area of the Mac 68040 chip at approximately 1500x magnification, photographed and colorized with David Scharf's Scanning Electron Microscope Multi-Detector Color Synthesizing System, and saved as a TIFF file.

When Scharf began to use the SEM, organisms such as plants and insects were never photographed alive. A specimen was dried out, chemically treated, hardened so its form would not change, and finally, gold-coated to make it conductive to the SEM's electron beam. Scharf devised a way to photograph live insects and plants with an SEM and to use the natural conductivity of living tissue to eliminate the need for gold-coating—a boon for scientists, since the characteristics of living and dead tissue are not the same.

In 1984, Scharf acquired an SEM and built his own lab. He subsequently made a video movie called *A Tour of the Honeybee* for the St. Louis Zoo, the first movie actually produced with a scanning electron microscope.

Hardware: Macintosh IIx with 8MB of RAM; DayStar Digital Power Card 030 40MHz accelerator; 600MB internal hard drive; SyQuest 44MB removable-cartridge drive; Apple CD-ROM drive; 19" RasterOps Trinitron Color monitor driven by RasterOps ColorBoard 724; 13" Sony NTSC color monitor and Apple 13-inch AppleColor High-Resolution RGB Monitor, both driven by RasterOps ColorBoard 232; RasterOps TrueCapture 324 frame-grabber board; RasterOps SFX video-output board.

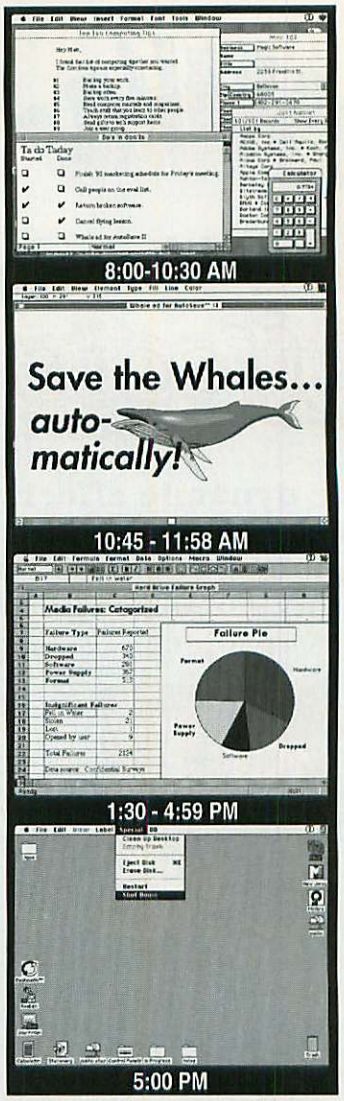
Software: RasterOps FrameGrabber 2.1; Adobe Photoshop 2.0; SuperMac's PixelPaint Professional 2.01.

How It Was Done: For the color photograph of a section of the 68040 chip shown on page 163 of our feature on the Mac Quadras, "The Quadra Quandary," as well as the color photos of other parts of the chip shown here, Scharf used his new invention, which he calls the Scanning Electron Microscope Multi-Detector Color Synthesizing System, to feed an RGB (NTSC) TV signal to the Mac's frame-grabber board. Although he previously used this color-synthesizing process to output to a video recorder, this is the first time he's used it with the Mac, or in fact, with any computer.

A scanning electron microscope normally has only one electron detector and no color capability. As part of his color-

continues

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synthesizing system, Scharf modified an electron microscope by adding two more detectors, which enables him to get three different electron illuminations of the same subject. The scanning electron beam emanating from the SEM's electron optical column hits the subject being imaged and knocks other *secondary* electrons off the subject. Since electrons carry a negative charge and the electron detectors are positively charged, these secondary electrons are attracted to the detectors. There the electrons are converted to electronic signals, which are then amplified so that they're strong enough to produce high-quality video. Because each electron detector "sees" the subject from a different angle—detecting or picking up different electrons from the subject and turning them into video signals—the "illumination" (by electrons, not light) defined by each detector is different. This difference is what enables Scharf's color-synthesizing image processor, or color processor, to create a wide range of colors from video signals that contain no color information.

The color processor has three signal inputs that come from the SEM's electron detectors. Each signal input has three controls for setting color: one for red, one for green, one for blue. By specifying different percentages of red, green, and blue, Scharf determines the color for each signal. For instance, if he encodes the signal coming in from one detector to become a blue signal and the signal from another detector to become a yellow signal, areas where those signals overlap will become green. Where signals from all three detectors overlap, the color processor produces a wide variety of colors. Color intensity is determined here as well; in fact, all the color controls that can be set within a color graphics or image processing program—brightness, contrast, hue, saturation, color balance—can also be set in Scharf's color processor, but by using dials instead of dialog boxes.

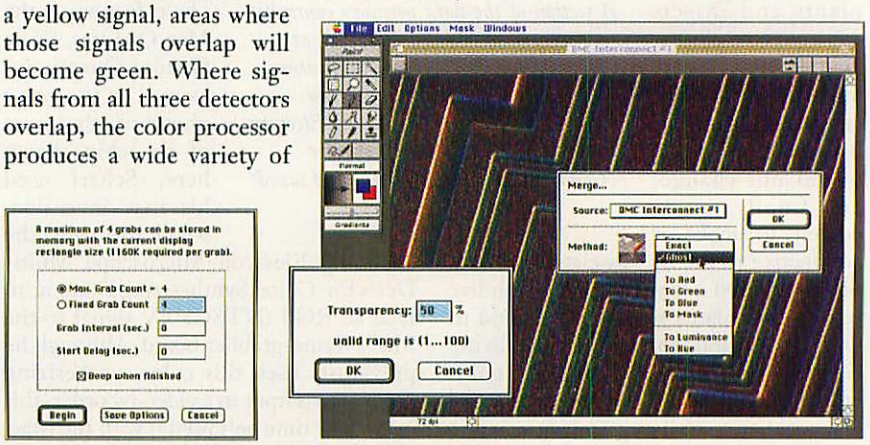
Output signals from the processor's color controls are fed into the RGB amplifier. From there they are converted into an NTSC television signal in RGB format, which in turn is sent from the processor to the Mac's frame grabber. Scharf uses a frame grabber that has an RGB input rather than just a standard television input, since an RGB NTSC signal produces a much higher quality image than a composite or an S-VHS (Y/C) signal.

To photograph the 68040 chip, Scharf first positioned it in the SEM's vacuum chamber, then set the magnifi-

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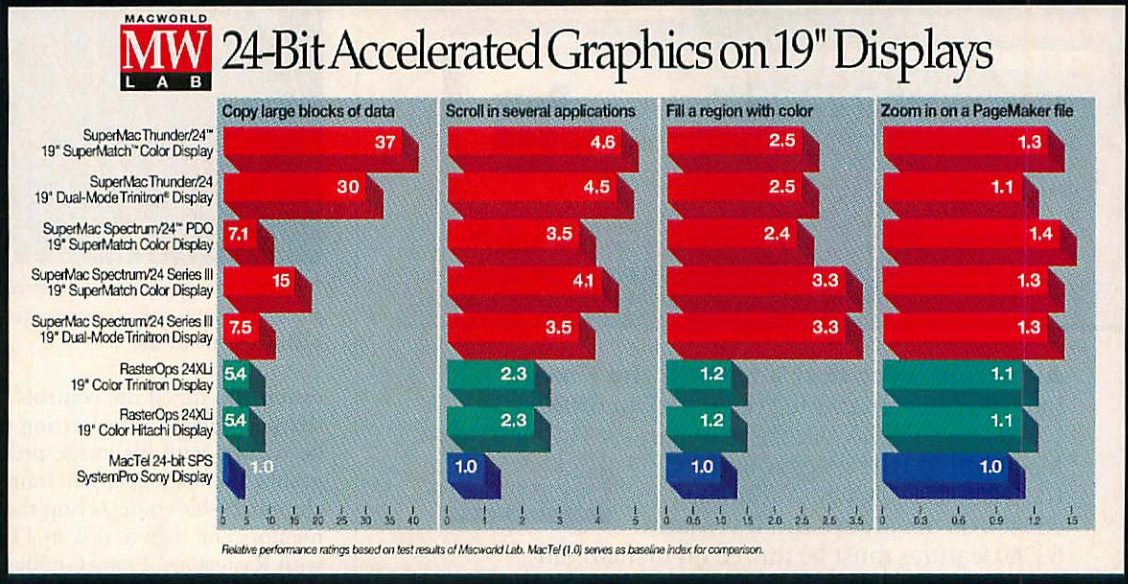


David Scharf's modified scanning electron microscope, or SEM. On the far right is the electron optical column. On the left is the console containing all the amplifiers and controls. The color processor is the keyboardlike object that sits on the left side of the console's desktop.



Using RasterOps' FrameGrabber software (left), Scharf saved four sequential frames of an image—here, the interconnecting traces of the 68040 chip's data memory controller—first to memory and then to disk. Scharf used PixelPaint Professional (right) to merge the four sequential frames at 50 percent transparency (ghosting), to reduce graininess. To get the best results, Scharf merged the first two frames, then the other two, and then merged the results of the original merges.

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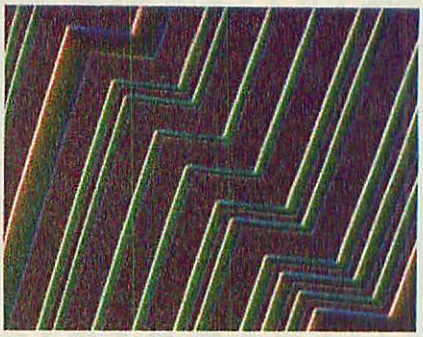
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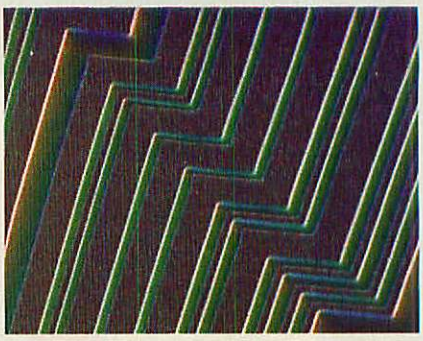
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One of the four original frames of the image, shown here at about 1200x magnification.



The final frame resulting from the three-step merge process in PixelPaint Professional after it had been adjusted in Photoshop.

cation and tuned the controls to get the sharpest image. After setting the colors he wanted with his image processor, he grabbed four sequential frames of the chip in 24-bit color, saving them first to memory and then to disk in TIFF format with RasterOps' FrameGrabber 2.1 software. Scharf used PixelPaint Professional to merge the four photographic frames into one. The purpose of the merging process was to improve the quality of the photo by reducing its electronic noise, or graininess. He began by merging two frames, then the two other frames, and finally, merging the results of the first two merges. For each merge, he set a 50 percent transparency (called *ghosting* in PixelPaint). He discovered that merging the results of the two initial merges produced a final image of higher quality than did merging the four original frames sequentially.

Scharf then used Photoshop to adjust the final image's contrast and brightness, and he used Photoshop's Sharpen Edges command on some of the photos (he had tried the Sharpen Overall command, but found that it increased the noise).

Scharf has also been using his color processing technique to produce real-time video footage with the SEM. He is currently developing a hardware-software system in which the SEM will emulate a scanner, enabling the input of very high resolution scans into the Mac. **m**

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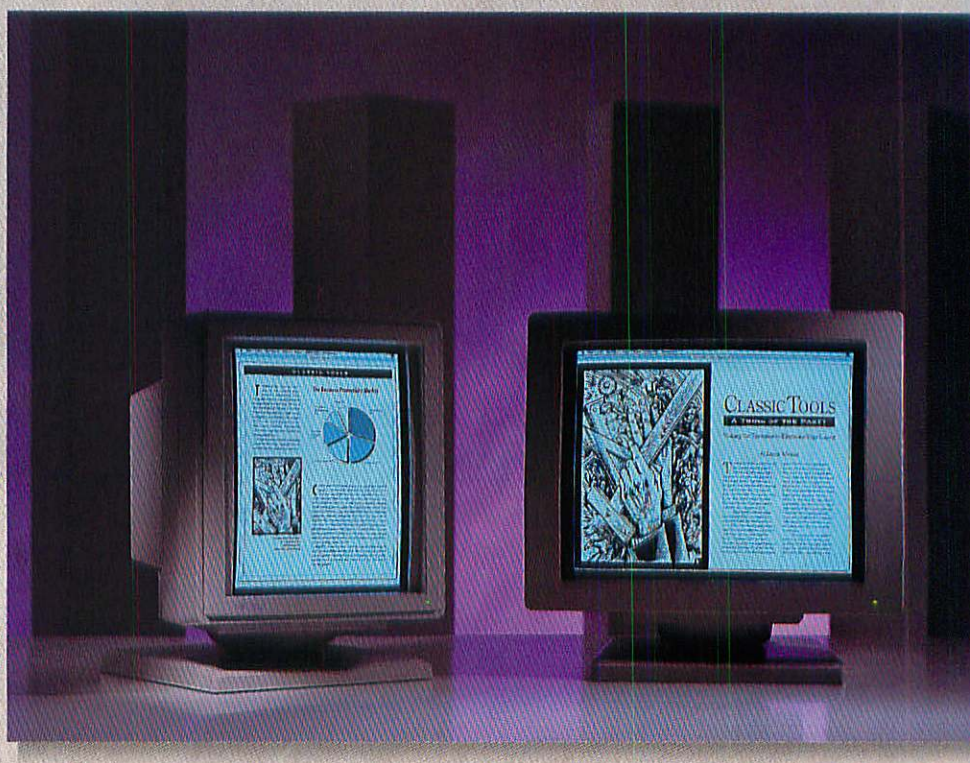
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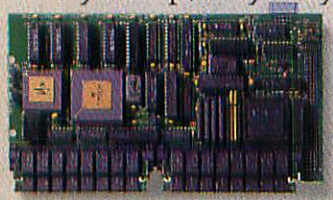
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Circle 89 on reader service card

High-Tech Lynchings

BY STEVEN LEVY

IT BEGAN AS THEY ALL DO, WITH a message from an individual with a fire in the belly. Or at least a fiery bellyache. In this case it was from a fellow called JHarris57. He'd read a review in this very magazine about a program he liked. The reviewer didn't like the program. JHarris57 didn't like the review. So he logged on to the Macworld Online folder of the America Online electronic conference service and uploaded his complaint. But he didn't just complain. He flamed. The review wasn't just wrong, he charged, it was inaccurate, ridiculous, appalling. And it wasn't just the review giving off an odor. It was the whole magazine. JHarris57 didn't leave a short message. He left a long one. With nine numbered charges of misconduct.

JHarris57 did not stand alone. Singsong came along and not only seconded the complaint, but called *Macworld* "spineless," and indicated that the review might be the result of the reviewer's acceptance of a bribe, "indirect or direct," from a competing product. Singsong "demanded space in the magazine to expose the review process as a charade."

Shilon chimed in. An enthusiastic user of the disparaged program, he was now "sure" the review was biased—the program's competitors were big advertisers in the magazine. BrentD agreed, adding his suspicion that the reviewer might never have used the program in question. He further wondered if the reviewer knew how to read.

At this point there were two comments implying that the reviewer and the magazine might not have been intentionally skewering the product as a result of a bribe. More users of the maligned product chimed in, and those previously heard from contributed long follow-ups. Some friction appeared between one of those who suggested that the reviewer was owed the benefit of a doubt and one of those who had no doubt of the reviewer's incompetency and bias. The word *payola* was used sufficiently often that it now seemed a foregone conclusion.

Eventually the reviewer himself was alerted to the war of words, and he posted his own message. Conceding some unfortunate but minor inaccuracies, he explained his views in detail and emphatically denied any hint of bribery or pressure to slant the review. From that point, the tone of the complaints softened. Singsong apologized for the personal tone of his messages. Though some hard-liners still maintained their unhappiness with the review, the form was less aggressive, modulated from shrill attack to a chastened grumble.

I recount this not to defend my employer, but to illustrate the arc of a classic electronic lynch mob. It bears all the fingerprints of these distressingly familiar online conflagrations. It begins as an issue that hits an emotional hot button among a certain constituency. A sudden outpouring of responses, characterized by a crescendo of invective, leads to an eventual disregard for standards of fair play and civility. Cautious lurkers issue an appeal to reason, which is quickly engulfed by the high tide of outrage. Next comes the turning-point, when a sir-have-you-no-decency respondent pulls the rug out from under the now-preposterous torrent of abuse. That's followed by a sheepish and gradual fade-out—only to have the same nabobs nattering again with the next tickle of their hot buttons.

A Nation of Grumps

THOSE WHO SURF THE DATAWAVES of Cyberspace, that imaginary location where online communication occurs, are all too familiar with this sort of thing. To a casual observer taking the temperature of the Network Nation, it would seem that it is populated in large part by the electronic equivalent of street toughs, ready at an instant to bludgeon some poor soul with brass knuckles of verbiage. Those who communicate via modem have long been familiar with the phenomenon of "flaming," the posting of passionate tirades. But more and more it seems that these flames are being lit in a tinderbox. It doesn't take much for a flame to ignite a conflagration.

I see it all the time on The WELL, the computer conference system where I most often hang out. Someone posts a provocative message, and within hours there are dozens of heated replies. A recent topic about a guy who was hustled from his table at a Berkeley, California, brunch house because he was reading *Playboy* evoked hundreds of responses in two days. In this thread, things moved from a general give-and-take between free-speechers and politically correctoids into an appeal for action, either picketing the restaurant or having a sit-in where everybody read porn mags while they sipped cappuccino. In another notorious online event on a different network, an otherwise routine debate wound up with one of the participant's ex-girlfriends spilling pillow-talk secrets about the guy.

This syndrome of raising the verbal stakes can occur on the positive side, too. A recent, intensely active topic on The WELL concerning the death of rock promoter Bill Graham saw an increasingly hyperbolic fusillade of praise. Graham was a major cultural figure and a truly decent human, and the remarks did him justice. But around the two-hundredth comment people were actually comparing him to Mahatma Gandhi. (I am not making this up.)

"We've been surprised at what sets people off," says Cliff Figallo, manager of The WELL. "All it takes to bring people in the fray is a couple of people expressing really rigid positions. Then you get rigid people on the other side of the question as well as moderate people trying to get people into the middle."



Digital vigilante squads take to the nets

Get the Vendor

THOSE ARE CONFERENCES set up for the express purpose of discussion. In vendor interest groups, the aims are different. In the Macworld folder of America Online, with discussion and dissent concerning our editorial opinions, a spirited give-and-take is welcome, even at the risk of civility. But some vendors on AOL say they have seen their product-support aims diverted by unhappy customers. Satisfied customers respond to the complaints, and soon the folder is cluttered with charges

continues

and countercharges—and business takes second place to acrimonious wrangling.

This is what occurred in Dove Computer's vendor folder last summer. A dissatisfied purchaser of a fax modem took his case to the public. (There were serious problems with DoveFax+ software last year, problems the company reportedly rectified in the fall with version 2.0.3.) People logging on to the Dove folder to register complaints, seek support, or obtain information on products were treated to this fellow's charges that Dove was dishonest, that Dove was fraudulent. When he heard that the company did not exclusively use its own DoveFax modems, he began his own folder within the Dove forum, specifically to mock the firm. (Dove explained that due to its accounting requirements, it used hard-copy fax machines on its order lines.)

The woman in charge of Dove's online customer support at the time was Page Gilley. She attempted to deal with the situation as best she could. But as the attacks continued and as the complainer directed some of the remarks to her, "it began to affect me personally," she says. "It got to the point where I dreaded going to America Online. If I would see his name on a comment, I would begin to feel ill—I knew I was going to get beat up."

Other people in the folder told the squeaky wheel to cool it, but he cited his freedom of speech. Indeed, because Gilley did not want to be accused of censorship, she didn't edit his comments. Yet as the ex-customer and the others sniped at each other, Gilley knew something had gone terribly wrong. "Members were fighting each other in our forum—and that's not why we were there," she says. "We're online for product support and information. It was wasteful, and certainly not constructive." In October Dove said it would close its folder for two weeks; in January the folder was reactivated.

Hello in There

CERTAINLY ONLY A MINORITY OF networkers get antisocial online. But the nature of the medium, and perhaps what makes it attractive for some, is that it amplifies isolated voices. When people post a comment, they know that for a brief instant they have the undivided attention of an audience. For some individuals, it is a blissful catharsis to take advantage of that spotlight. But the beam of this klieg can also be distorting. You don't know who's out there, or how your words may affect others. There are no visual cues to let somebody know when the line of good taste, or even coherence, has been crossed. Flamers feel free to let themselves go, even as the tone of their missives veers toward the sociopathic.

Just what makes flamers tick? I tried talking to the inquisitors who ripped the *Macworld* reviewer. The fellow who started the thread was a gentleman who told me that he had originally been so upset at the review that he was physically unable to drive his car. When control of his fingers returned to him, he set about complaining to us. I wanted to engage him in a discussion of online ethics, but he kept changing the subject to the product review, an apparently continual affront to his being. So I called the guy who charged our reviewer with "payola," and who later apologized, a 39-year-old graphic designer named Sal Soghoian.

Soghoian cheerfully agreed to discuss the dynamics of Cyberspace from the point of view of someone whose self-expression garners electronic hate mail from outraged networkers. Though he

continues

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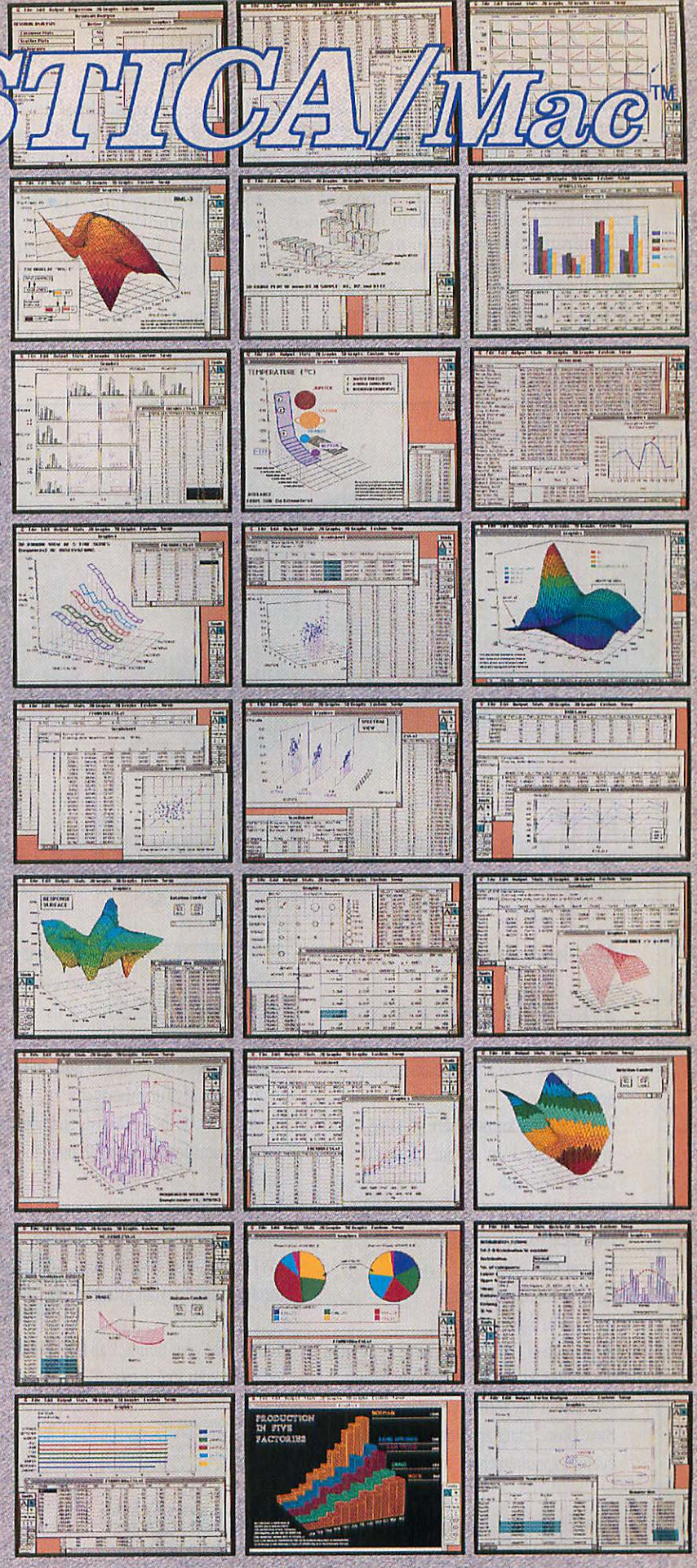
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considers himself a nice guy, he also estimates that probably a dozen people want to "string him up." Soghoian thinks that this notoriety is part of the lure of electronic communications. He compared the experience to Andy Warhol's oft-invoked "15 minutes of fame" quote. More apt would be the line about how freedom of the press belongs to those who own one. In Cyberspace everybody owns one.

"When you're online, it's almost like another place," Soghoian said. "The Bill of Rights comes alive. People *demand* their right to speak." In the case of the disputed product review, he explained, it was his chance, as a self-proclaimed little guy, to speak out publicly against the "*Macworld* behemoth."

But Sal, I noted, look what you wound up saying—you accused a guy of bribery with no evidence. "I was out of bounds," he admitted. "Since it's online you also have the freedom to say what you want without looking in someone else's eye."

My last call was to Jerry Saperstein, who under the log-in name of JerryType is a familiar, and sometimes dreaded, figure on America Online. A 49-year-old vendor of PostScript fonts, Saperstein had been the thorn in Dove's side.

"I'm a pretty aggressive guy who doesn't mince words," he said, with no apologies. "People who react adversely to myself or others [online] generally have an incredible sensitivity and an inability to understand words. Nuances don't go over online, nor do subtleties. A lot of people are very defensive, not sensitive, and uptight. Everything, to them, is a personal insult."

Saperstein believes that his own behavior was not really beyond the pale—he told me of several instances where other people *really* misbehaved online. He justified all his comments in the Dove folder by saying that he felt mistreated and wanted to let other people know what he thought of Dove. I asked him if he had been aware of the effect of his comments on Page Gilley, and he paused, if only briefly.

"No," he said. "And I'm not affected by it." Saperstein never wavered from his firm assessment of the situation: "If Page was having a physical reaction to it," he contended, "she shouldn't have been online in the first place."

At first, this seemed to me a mean-spirited response. But after thinking about it for a while, I had to admit there was something to what Saperstein said. The rough-and-tumble of online discourse is not only one of its hazards, but also a key source of its charm. People say what they damn please, figuring rightly that they can apologize later. Any hothead can command the attention of a crowd, and that crowd may well include influential people who even on a good day would not return a phone call from the likes of said hothead. Online, who you are doesn't matter—you are nothing but your words. Online, words are sometimes used sloppily, sometimes eloquently, sometimes cruelly. The First Amendment is indeed alive and well in Cyberspace, but it isn't always a pretty sight.

But neither is the First Amendment, once you get down to it. Free speech is supposed to accommodate all sorts of disagreements, nasty spats, and pure baloney. It's supposed to be equally accessible to poets, philosophers, scoundrels, and misfits. In an era when tolerance has reached its nadir, I'm encouraged that in at least one place, a standard of openness and free expression is still met. ■

Macworld columnist STEVEN LEVY is writing a book on artificial life.



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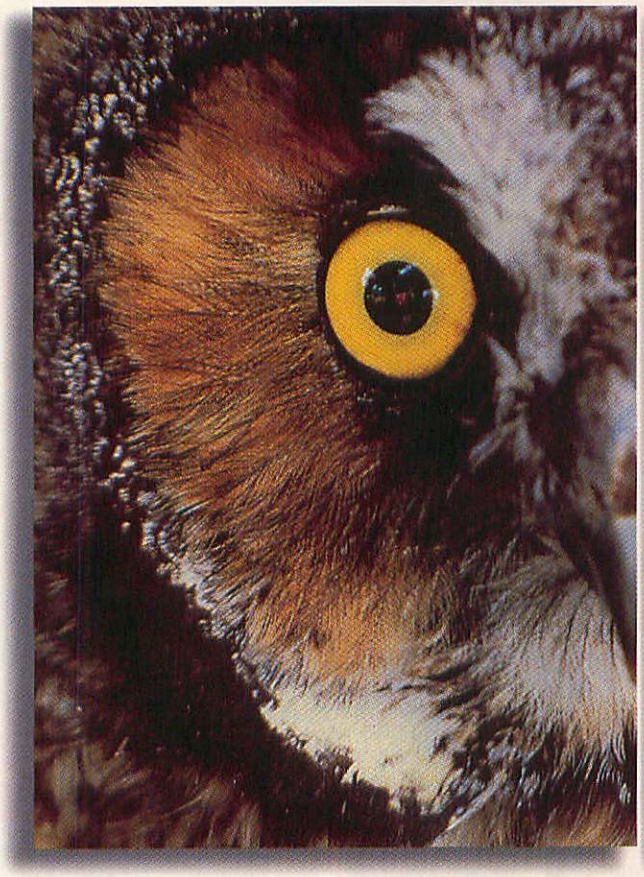
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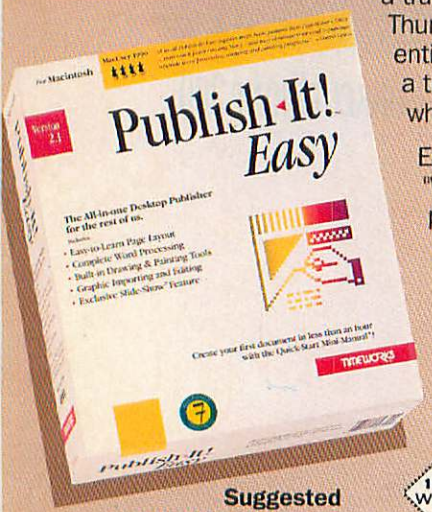
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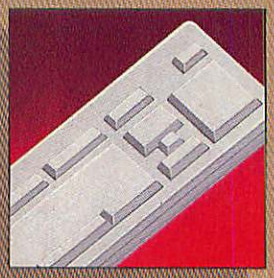
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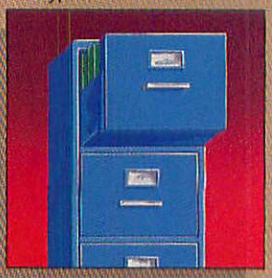
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The Earth-Friendly Macintosh

BY DEBORAH BRANSCUM

IN 1987 *HARPER'S* MAGAZINE caused a stir when it published an essay by Wendell Berry entitled "Why I Am Not Going to Buy a Computer." Part of Berry's argument against computing is that the energy such machines require is often the product of strip-mined coal. Few Macintosh users are willing, like Berry, to swear off computers altogether. But many are concerned about the impact the industry and computing itself have on Mother Earth. As it turns out, fairly small steps can make a big difference in protecting our resources.

We Got the Power

COMPUTER EQUIPMENT USES ROUGHLY 50 percent of the energy used in offices, according to *The Green Business Letter* from Tilden Press (202/332-1700 or 800/955-4733). In that light, the best thing about the Macintosh PowerBooks (and other portable computers) may be their low energy requirements. The original Macintosh Portable, for example, on average uses only 3 watts. There's a big difference between the power needs of desktop computers and smaller machines. And there's an overall increase in energy efficiency as newer models are introduced; a Mac SE/30 with a 20MB internal hard drive has about the same energy requirements as a Mac 512K with no hard drive. (A Mac II–family computer, however, needs considerably more.) Add-in boards that use custom chips, called ASICs, also use less energy than conventional boards.

Increased efficiency is evident in peripherals too, from storage devices to printers. *Electricity-Saving Office Equipment* is an excellent (if pricey) $950 report from Competitek, an information service of the Rocky Mountain Institute (303/927-3128). The Competitek report noted a nearly fourfold difference in wattage requirements between two different 80MB hard drive models made by the same manufacturer in 1990. An older technology 5¼-inch drive was rated at 15w, while a 3½-inch model was rated at 4w. Printers also vary in their energy needs. Laser printers are energy hogs compared with ink-jet and impact printers, according to the Competitek report. (Impact printers also use less energy than laser printers.)

The message is clear: While computer equipment is becoming more efficient over time, there's still a broad disparity in the amount of electricity used by existing products. If conserving energy is important to you, carefully check the wattage requirements of competing systems and peripherals before you buy. (Keep in mind that actual power use is generally much lower than the ratings.)

You don't have to buy new equipment in order to save energy. Simply turning off the computer when you're not using it can save an enormous amount of energy. The popular belief that hard drives are threatened by frequent on-off cycles is generally not true for drives manufactured after 1985, according to Competitek. A Quantum Corporation spokesperson confirmed that turning a drive on and off shouldn't shorten its life to any appreciable degree.

Such a move saves lots of energy, particularly if office workers turn off computers, printers, and photocopiers at the end of the day instead of leaving them on all night. Some offices ask employees to keep machines running for network backup, but there's a cost-effective alternative. Sophisticated Circuits (206/485-7979 or 800/827-4669) manufactures the PowerKey, a $119 ADB device that acts as a surge protector/power controller. The PowerKey lets you control an ADB-based Mac (including SEs and Classics) and up to three peripherals via an extended keyboard. The PowerKey's cdev can be programmed to turn a computer on and off at specific times. An upcoming product, PowerKey Plus, will control up to five peripherals, and a Mac and will be able to turn on and off any Mac-peripheral combination.

Competitek recommends turning off the computer if it will be idle for 10 minutes or longer. If that's not practical, try turning off the monitor, if that's possible. Monitors are often more energy-hungry than computers, and screen savers don't save any power.



Small actions can make a big difference

Recycling Revs Up

RECYCLED PAPER FOR OFFICE USE IS available from several mail-order sources, including Earth Care Paper (608/277-2900) and Paper Direct (201/507-5488 or 800/272-7377) for laser printer paper, and Inmac (408/737-7777 or 800/547-5444) for fanfold paper.

Earth Care claims that every ton of paper made from waste instead of trees "will save three cubic yards of landfill space, reduce air pollution by 74 percent, reduce water pollution by 34 percent, use 58 percent less water."

Office paper is often bleached white in a process that creates dioxin, a highly toxic chemical, as a waste product. Earth Care offers unbleached paper and white paper bleached using alternative methods. It also has a Minimum Impact Premium line of unbleached paper containing 100 percent postconsumer waste, which the company says works with many photocopiers, laser printers, and ink-jet printers. (Postconsumer waste refers to paper that has been used and discarded; often recycled paper contains preconsumer waste generated in paper manufacturing. Both forms of waste end up in landfills if they aren't reused.) Recycled paper costs 6 percent to 8 percent more than virgin paper, but costs should go down over time, according to Earth Care.

It's also possible to recycle toner cartridges from office equipment. Xerox (714/836-8042 or 800/822-2200) offers recycling kits for the spent copy cartridges from some photocopiers. Xerox pays the postage for customers who mail the cartridges to Xerox, which melts them down for recycling. In May 1990, Canon (516/488-6700 or 800/962-2708) set up a similar program that accepts Canon toner cartridges returned to the company from laser printers, photocopiers, and facsimile machines. Canon disassembles the cartridges, melts the plastic parts, then reuses the plastic in new cartridges.

The Recycleneur Institute (305/539-0701) also pays the postage for cartridges it

continues

receives, which are given to businesses to refurbish. In the early days, reusing cartridges got a bad reputation from "drill-and-fill" operators, who stuck tape over the hole they used to refill a cartridge, a practice that damages cartridges and may damage printers. Reputable companies disassemble a toner cartridge, inspect the drum, replace broken or worn-out parts, clean the works, add new, high-quality toner, and reassemble the cartridge.

Professional recyclers look at print quality and guarantee their work, according to the institute, which refers people to a local pro. Cartridges can usually be recycled three to six times or more and should cost about half the price of a new one (a new one is about $125). Don't shop on price alone—some drill-and-fill operators may still be out there. (Note that some dealers may claim that recycled cartridges void printer warranties.)

In December Qume (408/942-4000 or 800/421-4326) announced a similar corporate program for recycling laser-printer toner cartridges. Qume pays $5 per returned cartridge to a designated charity; recycled cartridges will retail for a suggested price of $79.

Recycled floppy disks are also available. Softdisk Publishing (318/221-8718) sells 25 recycled blank 3½-inch disks for $9.95 plus $3.50 shipping for the first package (shipping for additional packages is $1 per package). The company says it loses money on the program—which involves degaussing, relabeling, and shipping the disks—but makes up the difference from its internal cardboard-recycling program. Covenant Recycling Services (201/838-1336) accepts used floppy disks for recycling, which are usually sold to schools.

Industry Efforts

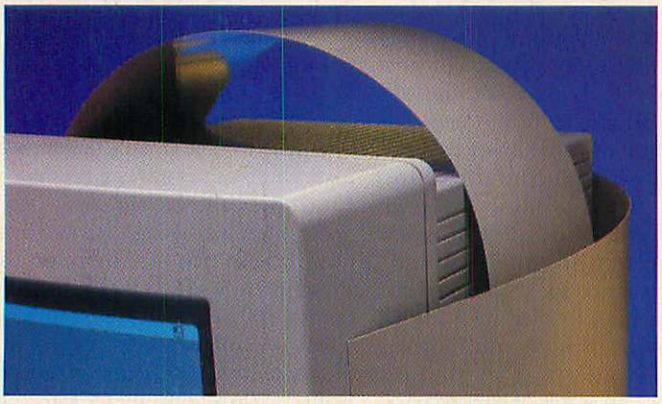
ACCORDING TO THE SILICON VALLEY Toxics Coalition (408/287-6707), high-technology companies in Silicon Valley produce more than 100,000 tons of hazardous waste annually. Some of that waste contaminates local groundwater. There are companies working to reduce their toxic output—the Santa Clara County Manufacturing Group reports that its 25 members reduced their overall chemical output by 41 percent between 1989 and 1990. The group's members include Apple, Digital Equipment, Hewlett-Packard, IBM, and Intel.

Many are reducing their manufacturing use of chlorofluorocarbons (CFCs), which deplete the protective layer of ozone in Earth's atmosphere. Apple, for example, has developed a "no-clean" process that eliminates the need for CFCs to clean printed circuit boards. The process has been introduced in most of its manufacturing plants worldwide, and the company expects to eliminate CFC usage entirely by the beginning of 1993, according to Erin Craig, Apple's manager of environmental products stewardship. Because batteries contain toxic materials and should not be thrown out in household trash, Apple is asking its service providers worldwide to accept spent batteries from its portable computers. Depending on local facilities, batteries will be recycled, if possible, or disposed of properly. Apple also recently adopted new, unbleached product packaging that averages a minimum of 40 percent postconsumer waste.

Several other companies, including MacConnection, Baseline Publishing, Portfolio Systems, and Kiwi Software, are reducing waste by using biodegradable packing materials or eliminating plastic shrink-wrapping. On its best-selling CD ROMs, Educorp has switched from plas-

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It's not surprising that this technology breakthrough comes from NoRad Corporation, the leader in computer radiation control. After 5 years, the original **NoRad Shield** is *still the one and only choice* for electric and high-range magnetic field shielding. And now, **ELF ProTech completes the circle of protection**.

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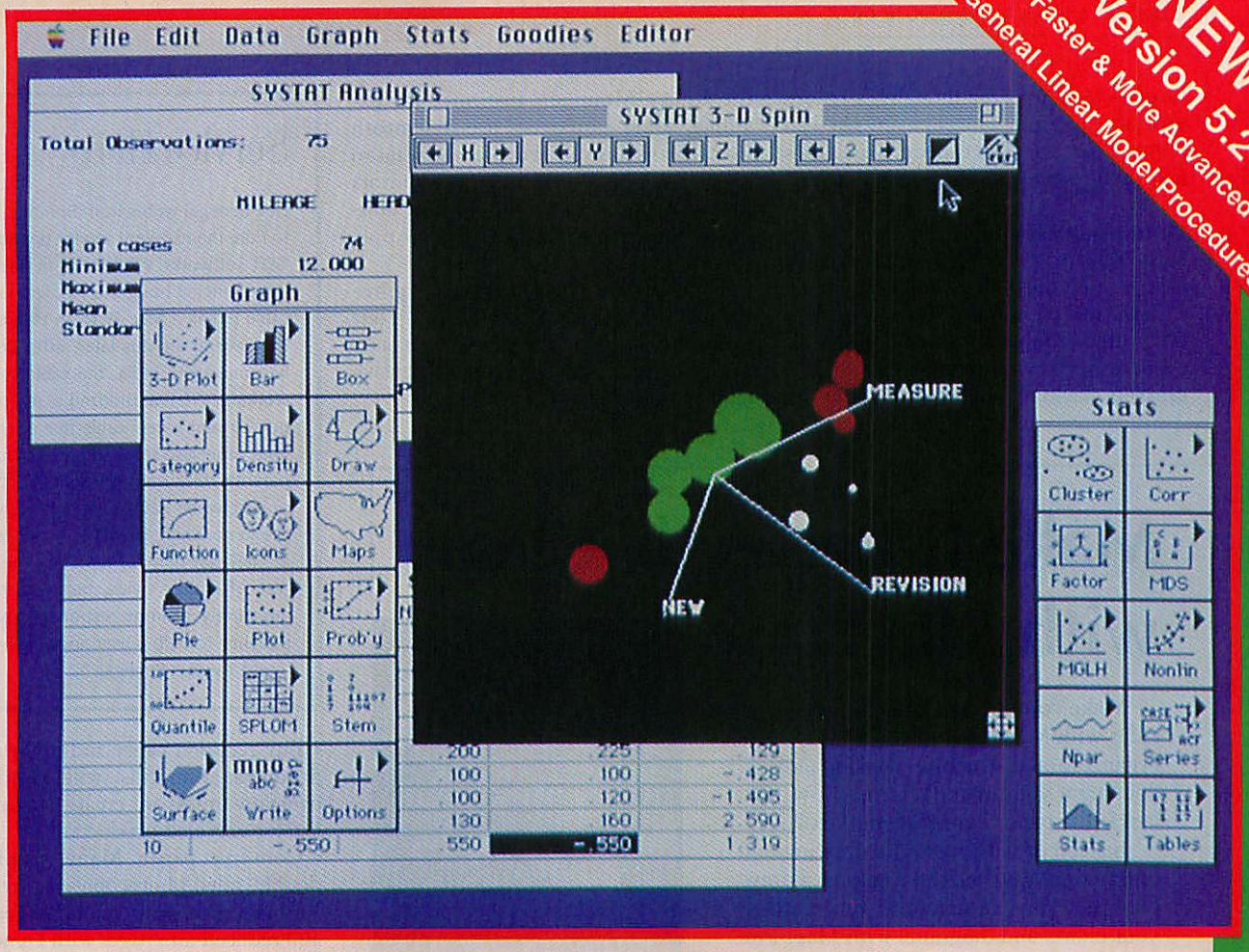
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*Sweden's National Institute of Radiation Protection, MPR II (1990:8).

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Circle 29 on reader service card

tic cases to paper, even though it's a more expensive process. The company has also reduced the size of its catalog, which uses half the paper of the earlier version.

Computing Lightly

MAC USERS CAN MINIMIZE THEIR impact upon Earth in several ways.

- Turn off computers, monitors, and other office equipment when not in use.
- Use a portable computer in lieu of a desktop machine whenever possible. At the Rocky Mountain Institute, for example, some employees use Macintosh Portables exclusively. People who want to save energy but also need large monitors for their daily work might consider adding a third-party display to an Apple PowerBook.
- Buy hardware with low power requirements. If an ink-jet printer meets your needs, for example, choose it over a laser printer, which is more energy intensive (and more expensive).

Service Hero

Dev Benegal writes from Bombay, India, to note the excellent service provided by GDT Softworks. While living in New York City, Benegal bought a Paralink Express cable to link a Mac SE to an HP LaserJet IIP. Several months later, after Benegal had moved to India, the cable stopped working. GDT authorized a return and quickly sent a new cable free of charge. That cable also stopped functioning, apparently because of the voltage conversion between 220V and 110V. "I would like to nominate technician Brad Dolman at GDT not only for replacing the cable free of charge twice, but also for the amazingly prompt responses and the patience to help a user anywhere in the world," writes Benegal.

- Buy recycled paper and other recycled products. Landfills will continue to overflow unless we create a strong market for recycled products.
- Conserve paper. Many people make double-sided photocopies to save paper. You can also print double-sided sheets and reduced-size pages with DynoPage, a printing utility from Portfolio Systems (408/252-0420). To conserve more trees (and energy) try using electronic mail instead of paper for memos. Fax modems can save energy too. A study by the Electric Power Research Institute suggests that sending a document by an overnight delivery service produces two to seven times more carbon dioxide than using an efficient fax machine.

With an eye to conservation, our computing can be both Earth-friendly and useful.

Mea Culpa

IN JANUARY'S COLUMN, "SAINTS AND Sinners Revealed," I shouldn't have included Canvas 2.1 in a roundup of buggy products. In that same paragraph, I meant to refer to Mouse Systems' PageBrush/Color Hand Scanner—not its optical mouse. Finally, Ventura Software deserves a halo—not horns—because it *did* send registered users the System 7 version of Ventura at no charge. My apologies. **m**

Research assistance by CAROLYN BICKFORD.

Send nominees for sainthood to Service Heroes, *Macworld*, 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop *Conspicuous Consumer* a line if a company is ignoring you.

Make It Perfectly Clear with MacFlow

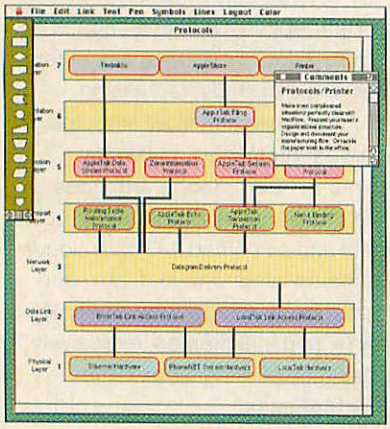


Make complicated situations perfectly clear with MacFlow. Present your team's organizational structure. Design and document your manufacturing flow. Or tackle the paper workflow in the office.

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MacFlow is ideal for designing and documenting any kind of flow relations. Creating charts and diagrams becomes so easy that you'll use it for all your projects.

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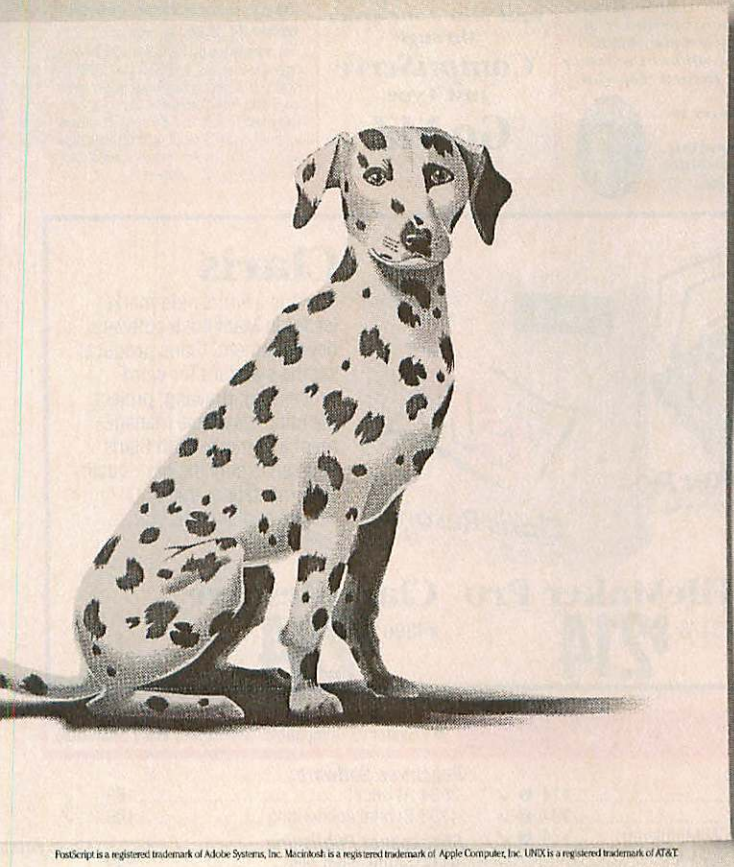
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fax (818) 991-4587

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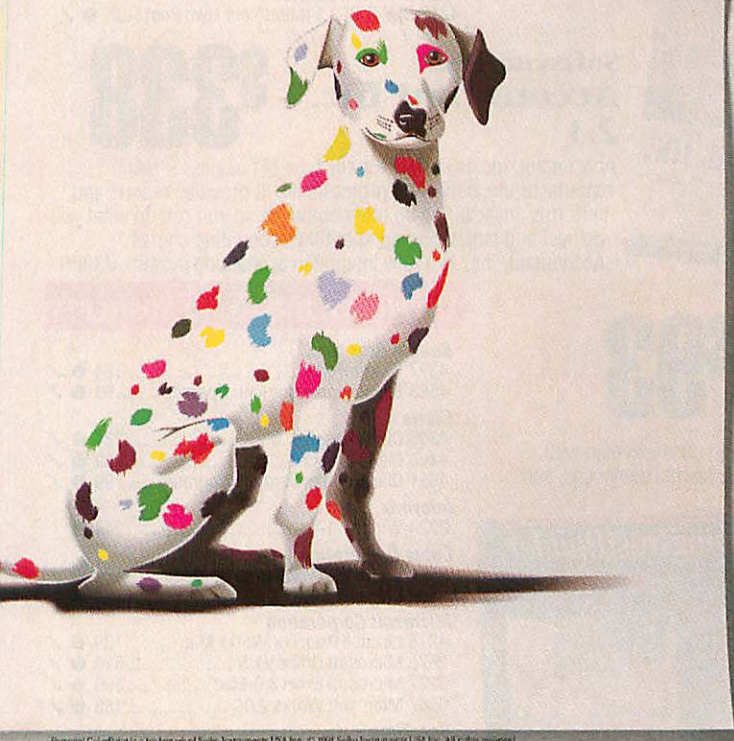
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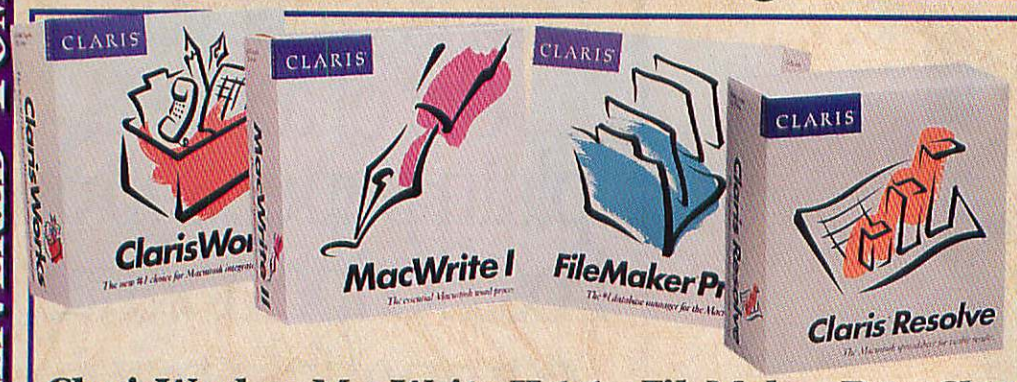
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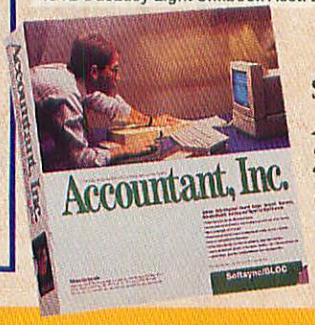
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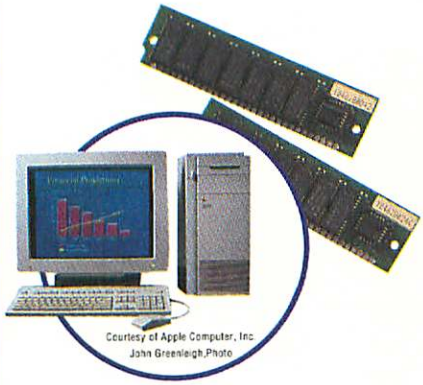
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04882	200	3.5"	Quantum	15	2.0-4.0	849	4
04883	320	3.5"	Seagate	14	4.0-5.0	1599	5
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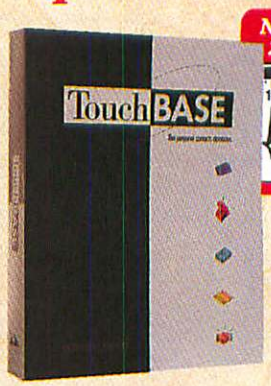
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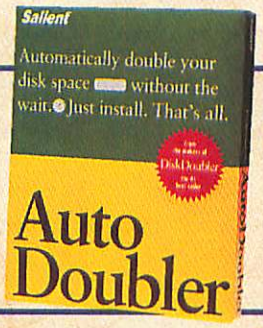
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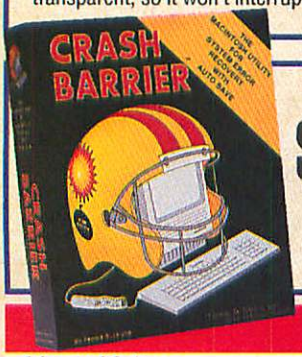
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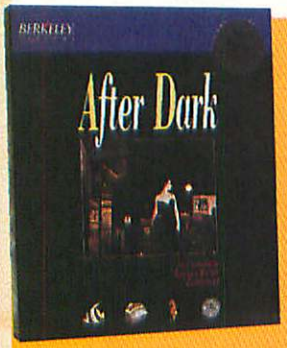
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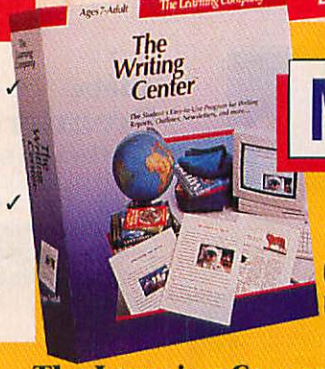
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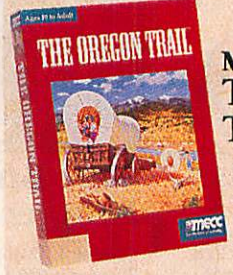
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4293 Flight Simulator 4.0 Mac ..... 39 ✓

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4675 King's Quest V 34
4677 Space Quest IV 34
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4229 Operation Tsunami BW 24
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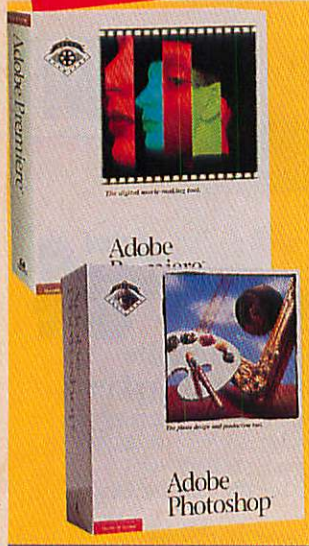
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3479 Nisus 3.06 ..... 244 ? ✓
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4532 Procite 2.0 ..... 195 ?
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4465 WriteNow 2.2 w/Grmtik&Mactools ... 99 ? ✓
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4477 American Heritage For The Mac ..... 54 ? ✓
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0803 Canvas 3.0 ..... 248 ? ✓
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3974 Animation Works ..... 120 ?
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0838 Macromind Three-D ..... 1028 ?
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0054 Multi Ad Search ..... 115 ?
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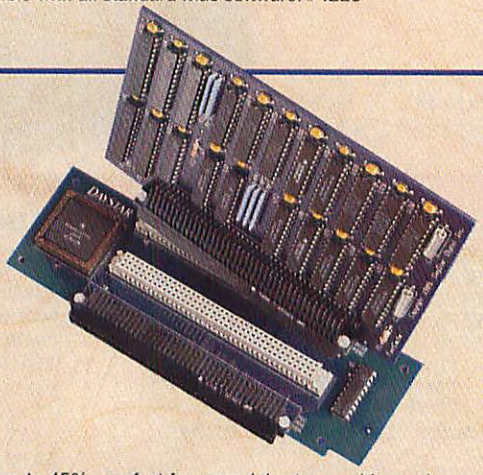


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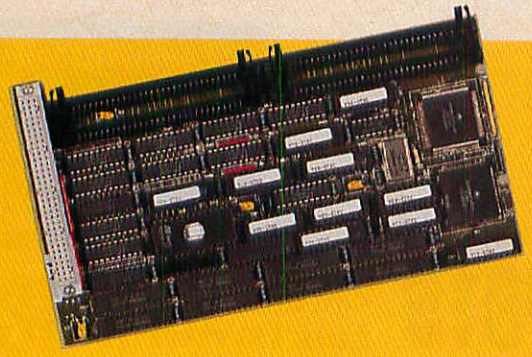
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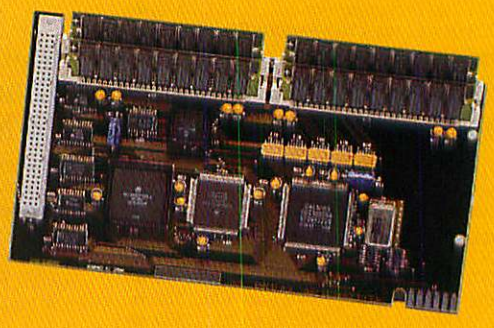
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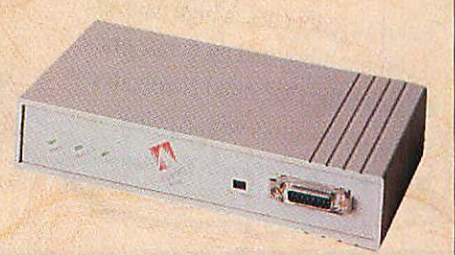
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- 3313 Promodem Travel Modem ... 122 ❼ ✓
- 0062 Promodem Ultima ... 634 ❼ ✓

Relisys
- 0256 Relisys Tefax W/Autofax ... 869 ❼ ✓

Supra Corporation
- 4351 Supra Fax Modem Plus ... 199 ❼
- 3368 Supra Modem 2400 Macpac ... 138 ❼
- 0065 Supra Modem 2400 Plus ... 148 ❼

U.S. Robotics
- 3665 Courier Hst Dual Std V.42 ... 978 ❼
- 4610 World Port 2400 MNP5 ... 249 ❼



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The Asante EN/SC is an external SCSI adapter for connecting slotless Macs, including the new Macintosh PowerBook computers, to Ethernet networks. The EN/SC includes ports for all three types of Ethernet media—thick, thin,10 Base T #847

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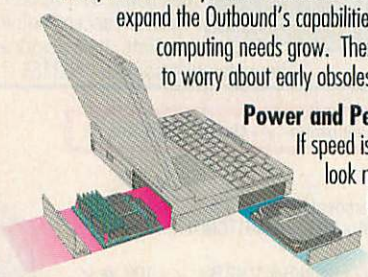
"Outbound's notebooks are solid machines and deserve serious consideration by anyone contemplating buying a Mac notebook." *Macworld Magazine*

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COMPARE FOR YOURSELF	Outbound 2000	PowerBook 100	Outbound 2030E	PowerBook 140	Outbound 2030S	PowerBook 170
Processor/Speed	68000/20 MHz	68000/16 MHz	68030/25 MHz	68030/16 MHz	68030/33 MHz	68030/25 MHz
RAM	2 to 4 MB	2 to 8 MB	4 to 14 MB	2 to 8 MB	4 to 14 MB	4 to 8 MB
Upgradeable CPU & Hard Disk	Yes	No	Yes	No	Yes	No
Silicon Disk Memory (RAM)	0 to 12 MB	0 to 6 MB	0 to 50 MB	0 to 6 MB	0 to 50 MB	0 to 6 MB
Hard Disk Drive	20, 40, 80 or 120 MB	20 MB	20, 40, 80 or 120 MB	20 or 40 MB	40, 80 or 120 MB	40 MB
Math Coprocessor	None	None	Optional 68882	None	Optional 68882	68882
Internal Floppy Drive	1.4 MB SuperDrive*	None	1.4 MB SuperDrive*	1.4 MB SuperDrive™	1.4 MB SuperDrive*	1.4 MB SuperDrive
Virtual Memory Capability	None	None	None	Standard	Standard	Standard
Display	10" Dia., 640 x 480	9" Dia., 640 x 400	10" Dia., 640 x 480	10" Dia., 640 x 400	10" Dia., 640 x 480	10" Dia., 640 x 400

* The 1.4 MB Floppy Disk Drive is SuperDrive-equivalent. Technical specifications subject to change without notice. The Outbound name, logo and TrackBar are trademarks of Outbound Systems, Inc. Apple, Macintosh and Mac are registered trademarks of Apple Computer, Inc. PowerBook and Apple SuperDrive are trademarks of Apple Computer, Inc. All other brand and product names mentioned are trademarks or registered trademarks of their respective holders.

OUTBOUND™

Outbound Systems, Inc., 4840 Pearl East Cr., Boulder, Colorado
Phone: 303.786.9200 Fax: 303.786.8611

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Updates

MARCH 1992

THIS SECTION LISTS
THE LATEST VERSIONS OF SELECTED
MAC APPLICATIONS
THAT WERE ANNOUNCED BY THE TIME
WE WENT TO PRESS.

PRODUCT	V.	REQ.	★	$
4TH DIMENSION	2.2	1MB/6.0		$99
A4	3.0	2MB/6.0.5		$395
AATRIX CHECKWRITER II	3.02	512K/4.1		*
ACCOUNTANT, INC. PROFESSIONAL	3.0	1MB/6.0.3		*
ACCUTEXT	3.0	4MB/6.0		$150
ACTA 7	7.0	512KE/6.0.5	2/92	$33.50
ADDMOTION	2.0	2MB/6.0.5		*
ADDRESS BOOK PLUS	2.0	1MB/6.0.2	2/92	$25
ADOBE ILLUSTRATOR	3.2	2MB/6.0.3		*
ADOBE PHOTOSHOP	2.0	2MB/6.0.2	9/91	$199
ADOBE TYPE MANAGER	2.0	1MB/6.0.2		FREE
AFTER DARK	2.0	512KE/4.1	5/91	*
AGENT DA	2.0	1MB/6.0.5		$30
AGFATYPE	3.0	2MB/6.0.2		FREE
ALARMING EVENTS	1.0.3	1MB/6.0.2	11/91	$15
ALDUS DIGITAL DARKROOM	2.0	1MB/6.0	9/91	*
ALDUS FREEHAND	3.1	1MB/6.0.5	8/91	*
ALDUS PAGEMAKER	4.01	4MB/6.0.3		*
ALDUS PERSUASION	2.0	1MB/6.0.5		*
ALDUS SUPER 3D	2.5	2MB/6.0.5		*
ALDUS SUPERPAINT	3.0	1MB/6.0.5	3/92	$65
ALLIANCE POWER TOOLS	2	1MB/6.0.4		*
AMAZING PAINT	1.0.1	512KE/6.0.4		$15
AME	2.0	1MB/6.0.2	5/91	$49.95
ANTITOXIN	1.4	512K/3.2		$15
APPLESHARE FILE SERVER	2.0	512K/3.2		*
ARCHICAD	4.0	5MB/6.0		10% OF LIST
ASHLAR VELLUM	2.10	4MB/6.0.2		*
ASHLAR VELLUM 3D	2.10	4MB/6.0.2		*
ATONCE	1.2	1MB/6.0.5		*
AUDIOMEDIA	2.02	2MB/6.0.7		$29
AURACAD	3.01	1MB/4.0		$90
AUTHORWARE PRO	1.7	2MB/6.0.5		*
AUTOSAVE II	2.0	512KE/4.2		*
A/UX	2.0	4MB/6.0.5		*
AZIMUTH	2.0	1MB/6.0.2	2/92	$45
BACKFAX	2.0	1MB/6.0.3		$75
BACKMATIC	2.0	1MB/4.2	2/92	*
BILL-IT	2.6	1MB/6.0.3		*
BITSTREAM TYPEFACE LIBRARY	2.0	1MB/6.0		*
BUSINESS SENSE	1.4.1	1MB/6.0		*
CA-CRICKET PRESENTS	2.0.1	1MB/6.0		*
CALENDAR	1.1.2	512KE/6.0	11/91	FREE
CANOPENER	2.0	512K/3.0		$29
CANVAS	3.0	1MB/6.0.2	1/92	*
CAPTURE	4.0	128K/4.1		$30
CARBON COPY MAC	2.0	1MB/6.0.5		*
CAT III	1.1	1MB/6.0		*
CHECKLIST	2.0	1MB/6.0	2/92	*
CINEMATION	1.0	4MB/6.07		NA
CLARIS CAD	2.0.2	2MB/6.0		$79
CLARISWORKS	1.0	1MB/6.0.5	3/92	NA
CLICKCHANGE	1.05.2	1MB/6.0.4		$5
CLICKPASTE	2.1	1MB/6.0		*
CMS UTILITIES	7.0	2MB/7.0		$25
COLOR MACCHEESE	2.07	1MB/6.0.5		$15
COLORSTUDIO	1.5	4MB/6.0.5	3/92	*
COMPUSERVE INFORMATION MANAGER	1.5	1MB/4.1		*
COMPUSERVE NAVIGATOR	3.0.4	512K/4.1		*
CONCERTWARE+	4.0	512KE/4.2		$15
CONNECTIONS	2.0	2MB/6.0.5		NA
CORRECT GRAMMAR	2.0	1MB/4.2		*
DATACLUB CLASSIC	2.0	2MB/6.0		*
DATA SHAPER	1.2	1MB/6.0		$40
DECK	1.03	2MB/6.0.7	4/91	FREE
DELTAGRAPH PRO	1.0	2MB/6.0.5		$75
DELUXEMUSIC CONSTRUCTION SET	2.5	512K/6.0.2		*
DESCARTES	1.04	2MB/6.0.3	6/91	FREE
D.E.S. DOCUMENT EXCHANGE SYSTEM	4.1	1MB/6.0		*
DESIGNCAD	3.0	2MB/6.0.5		*
DESIGNCAD 2D/3D	3.0	2MB/6.0.5		$50
DESIGNSTUDIO	2.0	1MB/6.0	11/91	*
DESKPAINT	3.07	1MB/6.0.5		$19.95
DIGITAL DARKROOM	2.0	1MB/6.0.4		$80
DISKDOUBLER	3.7	1MB/6.0.2	3/92	$15
DISKEXPRESS II	2.07	1MB/6.0		*
DISKFIT PRO	1.0	1MB/6.0	7/91	$32.50
DISKTOP	4.01	1MB/6.0		*
DISPLAY ADBUILDER	1.1	1MB/6.0.3		*
DOLLARS & SENSE	5.0	512KE/3.2		*
DOUBLE HELIX	3.5	1MB/6.0		$99

continues

V. = version #. **Req.** = min. RAM and system software required. ★ = last time (in the past year) this or an earlier version was reviewed. **$** = cost of update to registered owners. **NA** = first version, not applicable. * = contact your dealer for update policy. **Blue** = new version. **Yellow** = reviewed product.

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PRODUCT	V.	REQ.	★	$
DREAMS	1.1	1MB/6.0.2		*
DYNAPERSPECTIVE	2.3	2MB/6.0.5		$149
DYNODEX	2.0	1MB/6.0	2/92	$25
EASY COLOR PAINT	2.02	1MB/6.0.2		*
EHELP	2.0	1MB/4.1		$445
EMPOWER II	4.0.7	2MB/4.2		*
ENCORE	2.0.7	2MB/6.0.2		*
ENHANCE	2.0	2MB/6.0.3	11/91	$50
EVOLVE	1.1	2MB/5.3		$25
EZ VISION	1.0	1MB/6.0.3		NA
FASTBACK PLUS	2.6	1MB/6.0		*
FAST FORMS	2.0	1MB/6.0		$25
FASTLABEL	2.02	1MB/6.0		*
FASTTRACK	1.5	512KE/5.5		$20
FAXGATE (MICROSOFT MAIL)	3.0	1MB/6.0.3		$9/WORKSTATION
FAXGATE (QUICKMAIL)	1.5	1MB/6.0.5		$9/WORKSTATION
FILEGUARD	2.7	1MB/4.2		$18
FILEMAKER PRO	1.02	1MB/4.2		FREE
FILEVISION V	1.1	1MB/6.0.2		*
FILMMAKER	2.5	5MB/6.0.3		*
FINALE	2.6	1MB/6.0.2		FREE
FINDSWELL	2.01	512KE/3.2		*
FLEXICAD	2.20	5MB/6.0.4		*
FONTMONGER	1.0.5	2MB/6.0.2	10/91	FREE
FONTOGRAPHER	3.3	1MB/4.0.3		*
FONTSHARE	2.2	1MB/6.0		FREE
FONTSTUDIO	2.0	1MB/6.0.5		*
FORM Z	2.0	2MB/6.0		*
FOXBASE+/MAC	2.01	1MB/6.0		FREE
FRAMEMAKER	3.0	1MB/6.0	3/92	*
FREEDOM OF PRESS LIGHT	3.0.1	2MB/6.0.3		FREE

PRODUCT	V.	REQ.	★	$
FREEDOM OF PRESS PROFESSIONAL	3.0.2A	4MB/6.0.3		$250
FULL IMPACT	2.0	1MB/6.0		$50
FULLWRITE PROFESSIONAL	1.5	2MB/6.0.2		*
GENERIC CADD	1.1	1MB/6.0.5		*
GEOQUERY	3.0	1MB/6.0		*
GOFER	2.0	1MB/4.1		$25
GRACELAN	2.0	1MB/6.0.5		*
GRACELAN UPDATE MANAGER	1.0	2MB/6.0.5		NA
GRAMMATIK MAC	2.05	1MB/6.0		$15
GREAT GANTT	1.4	1MB/6.0		*
GREAT PLAINS ACCOUNTING SERIES	6.0	1MB/4.2		*
GREATWORKS	1.0	1MB/6.0.2		NA
GUIDE	2.0	512K/4.1		$50
HAND-OFF II	2.2.1	1MB/6.0		FREE
HELP	1.0	1MB/6.0	2/92	NA
HYPERCARD	2.1	1MB/6.0.3		$49
HYPERDA	2.0	512K/3.2		*
ICON-IT	2.1	1MB/6.0.2		*
IF:X FORMS DESIGNER	1.1	1MB/6.0		FREE
IGOR	1.2	2MB/4.1		$35
IMAGESTUDIO	1.7	1MB/6.0		$99
INFINI-D	1.1	4MB/6.0.4	9/91	FREE
INFOLOGIC ENVELOPE	1.1C	512KE/4.0		$5
INITPICKER	2.02	1MB/6.0		$10
INSIDE OUT	II	1MB/6.0.2		*
INSIGHT EXPERT ACCOUNTS PAYABLE	2.1.1	1MB/6.0		*
INSIGHT EXPERT ACCOUNTS RECEIVABLE	2.2	1MB/6.0.2		*

PRODUCT	V.	REQ.	★	$
INSIGHT EXPERT GENERAL LEDGER	2.2	1MB/4.2		$99
INSPIRATION	3.0	1MB/4.2	12/91	*
INSTANT-EXPERT PLUS	2.0	1MB/5.0		FREE
INTERFACE RAVE	2.0.5	2MB/6.0.4		FREE
INTOUCH	1.1	512KE/4.2	3/92	FREE
ITHINK	2.0	2MB/6.0.2		$149
KALEIDAGRAPH	2.1	2MB/6.0.5	9/91	$20
KIWIENVELOPES	3.1	512KE/4.1		*
LABVIEW	2.2	4MB/6.0.5	8/91	*
LANGUAGE SYSTEMS FORTRAN	3.0	2MB/6.0.4		$100
LAPLINK MAC III	3.2	512K/2.0		FREE
LAPLINK MAC PLUS III	3.0	512K/2.0		*
LASERPAINT COLOR II	1.02	1MB/6.0.3		FREE
LETRASTUDIO	2.0	2MB/6.0		*
LIGHT CHECKBOOK ACCOUNTING	2.0	1MB/6.0.3		*
LIGHTSPEED COLOR LAYOUT SYSTEM	2.5	1MB/6.0.5		*
MACANALYST	3.1	2MB/6.0		*
MACARCHITRION	5.5	2MB/6.0.3		*
MACDRAFT	2.1	1MB/6.0.2		*
MACDRAW II	1.1	1MB/6.0		*
MACDRAW PRO	1.0	1MB/6.0.5	11/91	$99
MACENVELOPE	5.1	1MB/4.2		$29.95
MACENVELOPE PLUS	2.0	512KE/3.2		$50
MACFLOW	3.5.4	1MB/6.0		$30
MACFORTRAN II	3.1	4MB/6.0.3		$99
MACGLOBE	1.0	1MB/6.0.4		*
MACLABELPRO	1.5	1MB/6.0.3		$19.95
MACLINKPLUS/PC	5.0	1MB/6.0.2	3/92	*

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MACMONEY	3.5	512KE/4.0		$12
MACPAINT	2.0	512KE/3.2		$25
MACPALETTE II	2.2	1MB/6.0.5		*
MACPHONEBOOK	3.0	1MB/6.0	9/91	*
MACPLOT PROFESSIONAL	3.7.4	1MB/6.0.5		*
MACPLOT STANDARD	3.7.4	1MB/6.0.5		*
MACPROJECT II	2.5	1MB/6.0		$99
MACRECORDER	2.03	512K/3.2		*
MACRENDERMAN	1.1	5MB/6.0.5		$75
MACROMIND DIRECTOR	3.0	2MB/6.0.5		$195
MACSCHEDULE	2.5	1MB/6.0		$30
MACSCHEDULE PLUS	1.0.5	1MB/6.0		FREE
MACSPIN	3.01	512K/4.3	3/92	*
MACTERMINAL	3.0	512K/3.2		$65
MACTOOLS DELUXE	1.2	1MB/6.0		*
MACTOPS	3.1	1MB/6.0.5		*
MACWRITE II	1.1	1MB/6.0		FREE
MANAGING YOUR MONEY	4.0	1MB/6.0.3		*
MANAPRO GENERAL LEDGER	3.1	1MB/6.0		NA
MAPGRAFIX	2.1.1	4MB/6.0.3		*
MARCOPOLO	1.1	1MB/6.0		FREE
MAPLE V		2MB/6.0.7		*
MARKET MASTER	3.0	1MB/6.0.3		$95
MARKUP	1.03	1MB/6.0		FREE
MASTERFINDER	1.1	1MB/6.0.5	6/91	*
MASTERJUGGLER	1.57	512K/6.0		$15
MASTERPLAN	1.03	512K/6.0.5		FREE
MASTER TRACKS PRO	4.52	1MB/6.0.2		*
MATHCAD	2.06	1MB/6.0.2		FREE
MATHEMATICA	2.0	1MB/6.0		*
MATHTYPE	2.1.1	512K/6.0.2		*

PRODUCT	V.	REQ.	★	$
MATHWRITER	2.0	2MB/6.0.5		*
MEDIATRACKS	1.01	1MB/6.0.2		FREE
MENUFONTS	4.01	1MB/6.0.5		$20
METAPICT	2.0	512KE/4.5		$69
META PRO	2.03	1MB/6.0		*
MICHAEL'S DRAW	1.0	1MB/6.0.5	12/91	NA
MICROPHONE II	3.0	512K/4.2		*
MICRO PLANNER MANAGER	1.0	2MB/6.0		*
MICROSOFT EXCEL	3.A	1MB/6.0.2	9/91	*
MICROSOFT FILE	2.0	512K/3.2		*
MICROSOFT MAIL	3.0	1MB/6.0.2	8/91	*
THE MICROSOFT OFFICE	1.5	1MB/6.0.2		$129
MICROSOFT POWERPOINT	2.01	1MB/6.0		FREE
MICROSOFT PROJECT	1.1	1MB/6.0.4	11/91	NA
MICROSOFT WORD	4.0d	512KE/3.2		$129
MICROSOFT WORKS	2.0e	512K/6.0		*
MINDLINK	2.0	1MB/6.0		*
MINDWRITE	2.1	512KE/4.2		*
MINICAD+	3.1	1MB/6.0	7/91	*
MOCKPACKAGE PLUS UTILITIES	4.4	512KE/3.2		$15
MODELSHOP II	1.1	1MB/6.0.2	3/92	FREE
MORE	3.1	1MB/4.1		*
MR. FILE	1.1.1	1MB/4.2		FREE
MULTI-AD CREATOR	3.0	2MB/6.0.3		*
MULTILEDGER	1.1	512K/3.2		$75
MUSICPROSE	2.1	1MB/6.0		FREE
MUSIC PUBLISHER	2.5.2	1MB/6.0	12/91	$15
MYADVANCEDMAILLIST	3.0	512K/4.1		*
MYDISKLABELER III	3.0.4	1MB/6.0		*
M.Y.O.B.	2.0	1MB/6.0	10/91	*
MYTIMEMANAGER	4.0	1MB/6.0.3	11/91	*

PRODUCT	V.	REQ.	★	$
NETMINDER ETHERNET	2.0	2MB/6.0		*
NETWORK BUNDLE FOR THE MAC	3.0	512K/3.2		*
NETWORK SUPERVISOR	2.0	2.5MB/6.0.3		*
NISUS	3.05	1MB/6.0.2		*
THE NORTON UTILITIES FOR THE MACINTOSH	1.1	1MB/4.2		$19
NOW UTILITIES	3.0.1	1MB/6.0.4	2/92	$49
NUBASE FOR THE MAC	1.3	1MB/4.1	1/92	$75
OCTAVO TYPECHART	1.5	1MB/6.0.4	7/91	FREE
OMNIPAGE	3.0	4MB/6.0		$25
OMNIS SEVEN		2MB/6.0		*
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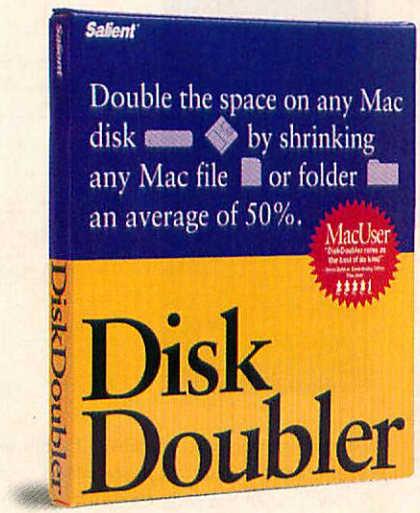
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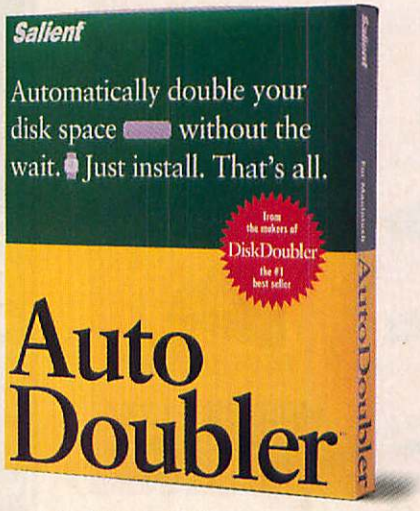
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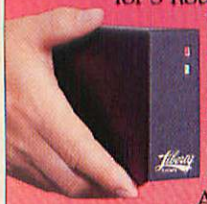
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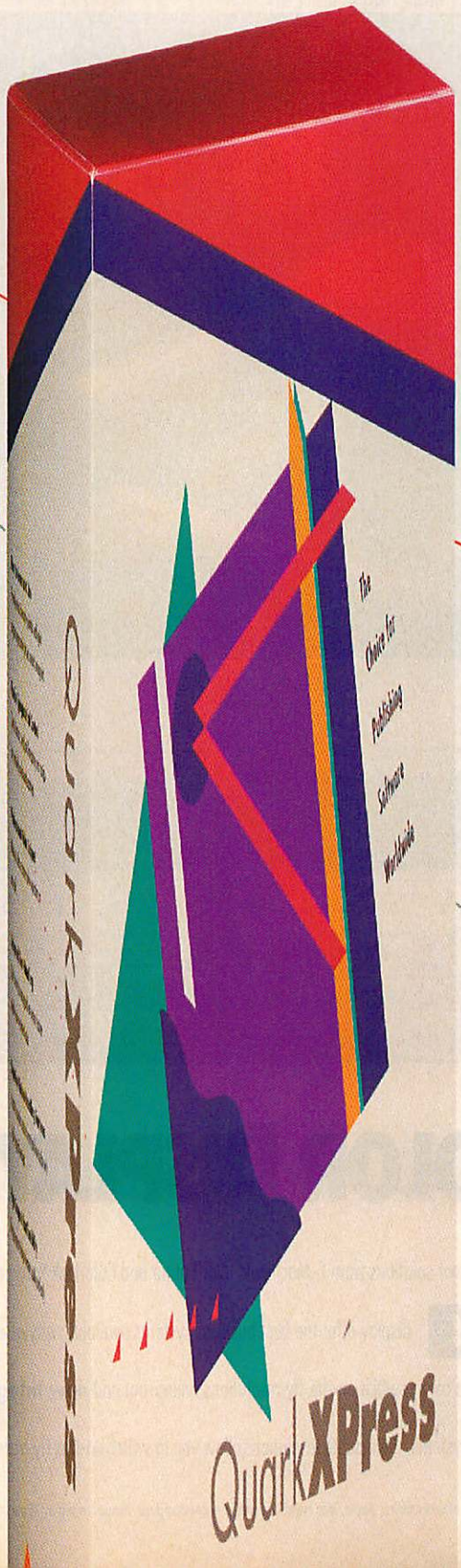
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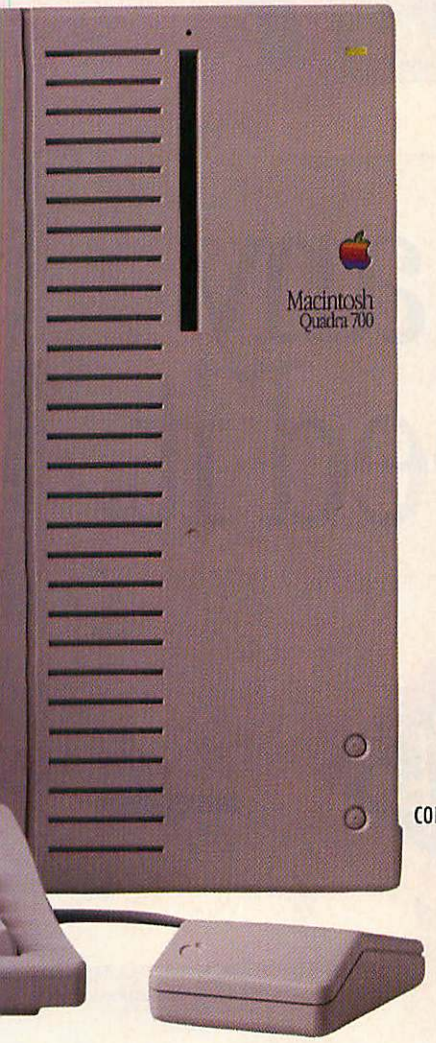


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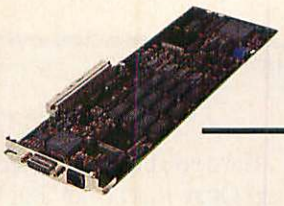


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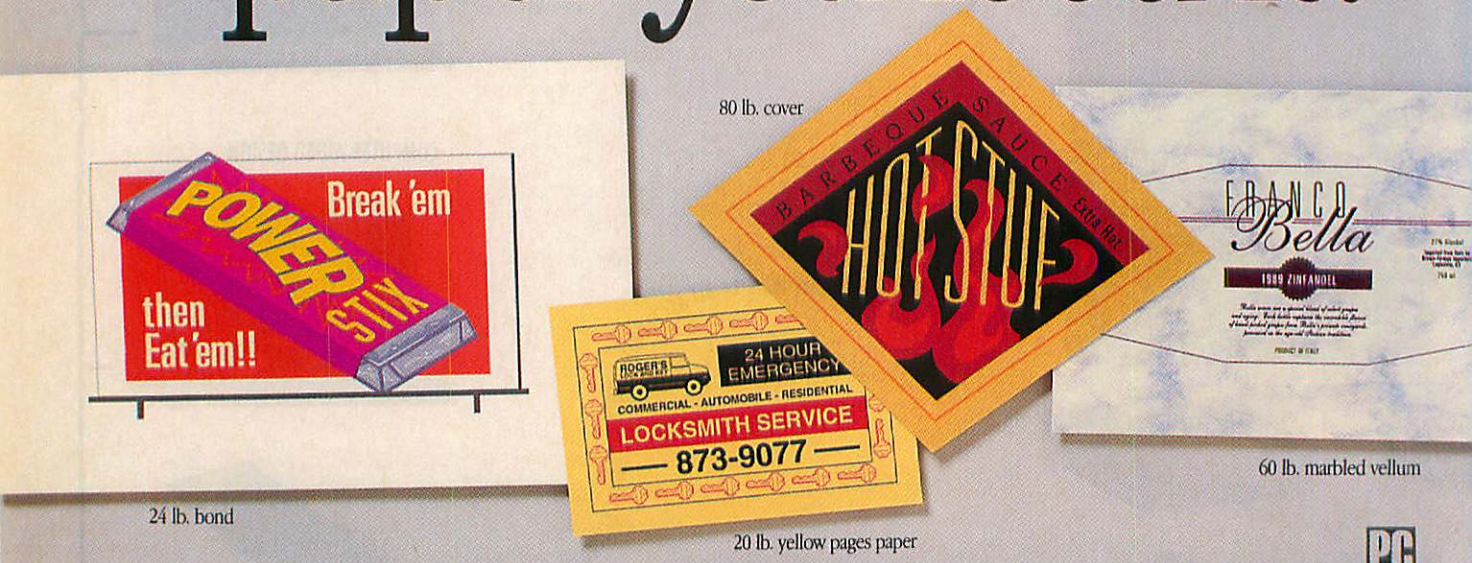
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Lab Notes

Of Image Compression and Virtual Memory

BY MARK HURLOW

MACWORLD LAB TESTED SEVERAL image-compression products for "Image Compression Matures," in this issue. In the process, we discovered that the most serious bottleneck in compressing large files isn't the compression product itself but whether it uses Apple's virtual memory implementation under System 7.

To compress images that require more memory than is available in RAM, some form of virtual memory (VM) is necessary. Using VM, an application moves portions (called pages) of a program or document between RAM and a hard drive (or other storage device), putting the most-immediately-needed pages in RAM and moving less-urgently-needed pages to storage. If there's not enough RAM, Apple's VM scheme swaps data back to virtual memory in 4K pages. The process is repeated until the needed data is written to the virtual memory space, which takes quite some time if the image is large.



HANK OSUNA

Developers have three choices for dealing with images that don't fit into physical memory: (1) They can take an application-independent approach by using virtual memory under System 7 or a third-party alternative such as Virtual from Connectix; (2) they can use existing virtual memory schemes built into some image editing programs, such as Adobe Photoshop; or (3) they can add a proprietary virtual memory scheme to their own image-compression products.

At the time of *Macworld*'s tests, only RasterOps followed Apple's strategy solely. (The company says a utility, called a plug-in, is in the works to allow users to do compression within Photoshop.) Storm Technologies' board-and-software combination relies on System 7's VM, but also includes a Photoshop plug-in. Kodak's software, Neotech's board, SuperMac Technology's hardware and software product, and Radius's software all use proprietary schemes.

Slowly but Surely

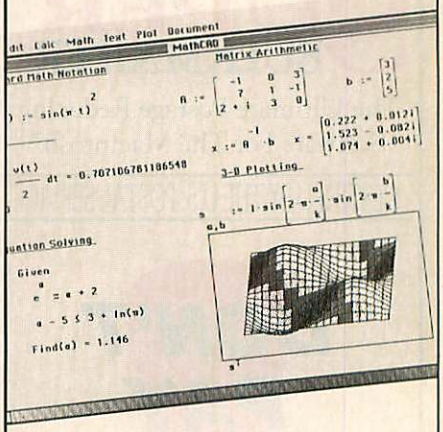
WE FIRST NOTICED A PERFORMANCE problem under System 7's VM scheme while working with the StormCard, Storm Technologies' image-compression board, and its PicturePress software. We activated virtual memory under System 7 on an 8MB Mac IIfx, then opened a 14.7MB TIFF file within PicturePress. After selecting the file, we waited about 4 minutes for the image itself to open. It took 1.5 minutes for the File menu to appear after we selected it. Finally, we selected the desired compression setting and clicked on the start button. Because hardware-based compression products are optimized for speed, we were surprised when the Storm product took 84 seconds to compress the file, while ImpressIt, a software-only product, required 96 seconds. The Storm product did much better, compared to ImpressIt, with a smaller, 6.7MB PICT test file (and had no problem compressing the 14.7MB file within Photoshop, which is owned by most StormCard users, according to the company).

We replaced the StormCard with a RasterOps ImagePak board, activated virtual memory under System 7, restarted the computer, and tried compressing the 14.7MB image. No luck. It simply wouldn't work, and neither we nor RasterOps could figure out why.

We tried again with a 6.7MB PICT image, which took almost 6.5 minutes to

continues

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open. The result was disappointing—it took the ImagePak 96 seconds to compress the 6.7MB file. In contrast, Impress-It, which uses a proprietary VM scheme, took roughly 2 minutes to open the test file and compressed it in 56 seconds.

As these examples show, users of memory-intensive applications, such as compression software, are not well served by System 7's virtual memory scheme.

If taking advantage of System 7's virtual memory creates such a bottleneck, you might ask why RasterOps chose to do it. But there are advantages to using System 7's VM, including compatibility, portability, and ease of programming. A RasterOps engineer told us that the company used System 7's virtual memory scheme to stay compatible with future revisions of the Macintosh Operating System, and to avoid rewriting something that already exists.

Photoshop Plug-Ins

STORM, RADIUS, AND NEOTECH SUPply their image-compression products with Photoshop plug-ins, which can also be used by ColorStudio and Micro Frontier's Enhance. These image-editing programs implement more efficient virtual memory schemes than Apple's. (Photoshop, for example, swaps 32K pages between RAM and the hard drive, while Apple's VM works with 4K pages.) With a plug-in, all data input and output is handled transparently by the image-editing program, which means the actual compression application needn't worry about VM. Another advantage is that you can compress and decompress an image within the image-editing program, making it unnecessary to switch over to a stand-alone compression application. Also, unlike System 7's virtual memory, Photoshop and similar programs do not require a PMMU chip to run. And since Photoshop can open different types of files, a user can compress a file that exists in a format not supported by the stand-alone applications.

Nothing is perfect, however. According to the Photoshop manual, the program's virtual memory scheme requires that combined free space in RAM and on the hard drive be three to five times the size of the file you are compressing. That's quite a bit more space than Apple's virtual memory requires. And using a plug-in may make it impossible to access some specific features of a stand-alone compression package. For example, StormCard users do not have access to PicturePress's JPEG++ compression feature when they use the plug-in option.

Proprietary Schemes

SOME VENDORS HAVE IMPLEMENTED custom memory-management schemes. One reason is that many people continue to use System 6; another is that a proprietary scheme is under the complete control of its developer. Programmers can structure a page-swapping algorithm to match the memory-access pattern of their applications. When programmed correctly, applications perform much better using their own memory scheme than when running under System 7's virtual memory, which cannot reflect how each specific application accesses data.

Radius and SuperMac use proprietary memory-management schemes in their software. When you want to compress an image, both programs create a buffer on the hard drive and store the image there. If the applications need a portion of the data that is not available in RAM, the applications go into the buffer and fetch that portion.

A British company, Neotech, takes a unique approach to compression. Neotech's board and software don't compress open files. This means you avoid the VM bottleneck, but you lose the ability to preview images before compression. During compression, the application reads a range of pixels in the image from the hard drive to the compressor's memory buffer, sends the pixels to an optimized chip for compression, then it gets the next range of pixels and repeats that process, until the file is compressed. Neotech's product compressed the 14.7MB file in just under 35 seconds.

Proprietary virtual memory schemes have some drawbacks. They may cause compatibility problems, especially where image-compression software must coexist with other applications under System 7's VM. Proprietary VM schemes may be slow, but they're not as slow as System 7's VM. Finally, as with the other memory schemes, the size of the image you can compress is limited by the amount of available hard drive space.

If your compression needs are limited to small files that don't require the use of virtual memory, or if you need to use VM only a couple of times a week, the VM bottleneck probably won't be a problem for you. But it could be an issue if you deal with large image files often and you've reached your RAM limit—either because your Mac won't hold any more, or because you can't afford any more. In that case, you're probably better off getting a product that uses a proprietary VM scheme or that comes with Photoshop plug-ins. See "Image Compression Matures" for *Macworld*'s specific buying recommendations. **m**

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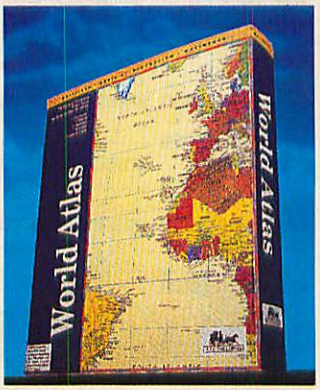
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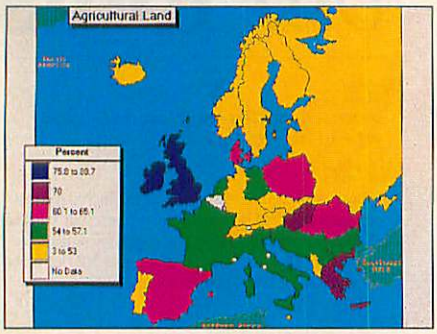
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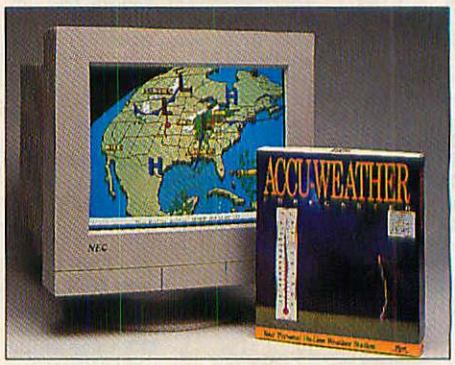
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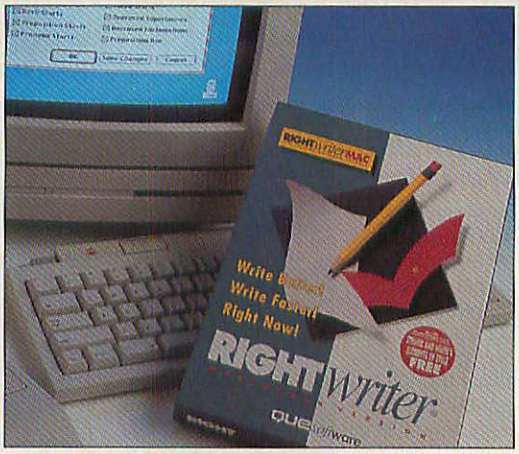
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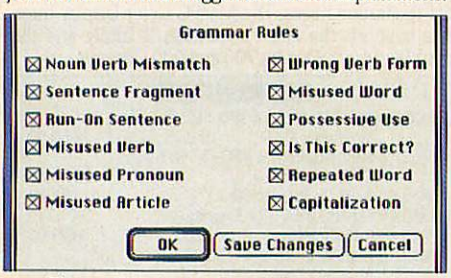
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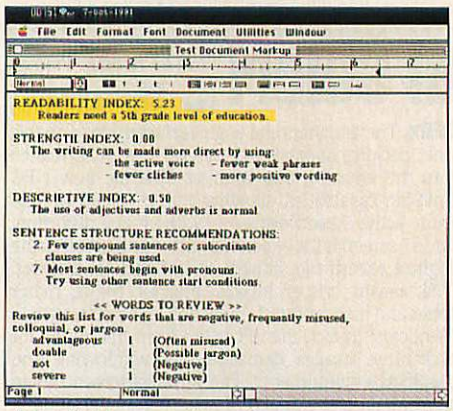


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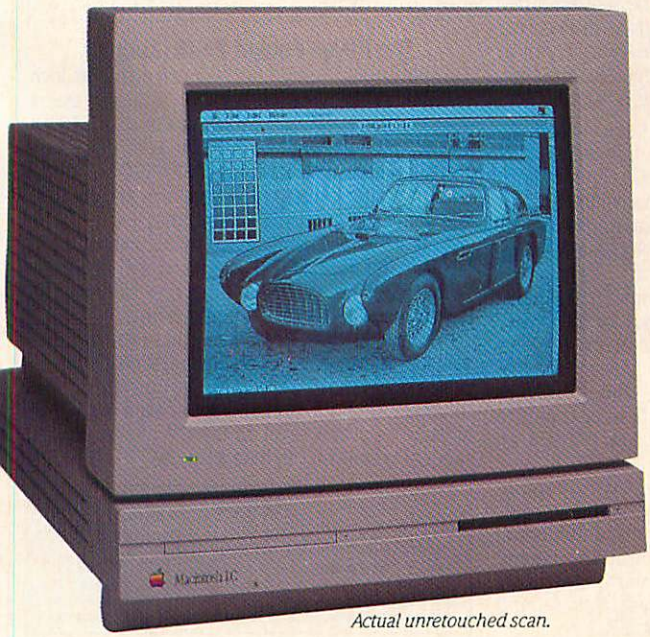
The Science of Scanning. Logitech technology destroys the old barriers of scanning, increasing the speed and accuracy of anything you scan. Superior image quality, with the ability to produce halftones for reproduction. The set of output controls provide the best possible results on any printer or monitor screen. Its 4" wide scanning area allows full-page scans with just two quick passes.

And Logitech's rugged construction and precision roller system allows straight, unwaivering scans. No curving, no skipping. The scanning speed indicator controls the movement for perfect scans every time. There are three settings for scanning photos and another for scanning line art. Its shape is perfect, its weight and components distributed equally for balance. All of which makes getting an image from paper—into your Mac, simple and easy.



The ScanMan 32 gives you a free set of software editing tools, including a 32 gray scale palette for detailed retouching. There's also a handy dimension box and tear off tool palette; use them alone or incorporate them as a desk accessory. Pop up real-time brightness and contrast controls, refine images with amazing flexibility, rotate, flop and invert images. Save your scans in a variety of formats, including MacPaint, TIFF and PICT).

Here's What You Get: The ScanMan 32 contains everything you need. The Model 32 Gray Scale scanner, SCSI interface box and cable, power supply adaptor, ScanMan software, version 2.0, CatchWord Pro OCR software and complete user guide. Fast, easy, compatible — and powerful — the ScanMan 32 is a superior hand scanner.



Actual unretouched scan.

Included with ScanMan 32 — CATCHWORD PRO: Powerful Optical Character Recognition (OCR) software that allows you to capture printed, hard-copy data by scanning it, rather than typing it. But, without quality software and a high quality scanner (like the ScanMan 32), scanning text won't work properly. "Dirty" scans produce unwanted characters and commands, requiring enormous cleanup — creating more work than rekeying.

CatchWord Pro delivers an amazing 99% accuracy in OCR testing, used in tandem with the ScanMan 32. CatchWord Pro is compatible with popular word processors, spreadsheets, databases and desktop publishers — so you can scan information directly into your application and use it immediately! Different typestyles and sizes are no problem, any printed characters, in any size of typestyle are instantly recognized. It will even automatically convert two scans into one, full-page image.

What about larger, memory-intensive photos and pages packed with small type — don't they slow my system to a crawl? The answer is "no" and only Logitech can say that. While other scanners are notorious for system slowdown, all of your ScanMan 32 scans zip along with Logitech's ingenious memory management features that automatically swap image data between your system's RAM and hard disk.

The instrument itself is a masterpiece. From the genius of the respected industrial design firm, Frogdesign — also responsible for the new line of NEC monitors and other distinctive hardware products, the ScanMan 32 is different from the ground up. First, you'll notice that it's heavier, with precision rollers that provide more "grip" along with a superior guidance system for light-touch control. All of which means you can scan quickly and accurately — once — and capture the image perfectly. While many other hand scanners rely on you to move in a straight line as you scan, the ScanMan 32 provides fully balanced, direct movement.

Using the ScanMan 32, you can create instant layouts, experiment with backgrounds and special effects. Add text and explore sizing and cropping options within seconds. That's why the hand scanner has caught fire in the design world: its ability to let you see many different visual combinations.

Businesses use scanners to capture text as described above and for keeping archival records of paper documents with instantaneous access. Logitech's advanced technology gives you more flexibility, more creative tools and more value than any other scanner.

Although there are two basic scanning modes in ScanMan, there are in fact three ways of scanning an image: Line art mode, Gray mode, or Mixed mode.



Line Art Mode. Line Art mode is useful for scanning black and white line drawings, diagrams, and text. This mode produces high-contrast images in black and white (no grays).

Gray Mode. Gray mode is useful for scanning photographs, color images, and drawings where the high-contrast black or white character of Line Art mode detracts from the quality of the image.

Desktop publishing programs enable you to combine your ScanMan images with text. Most of these programs accept either PICT or TIFF format files. PICT format enables you to work with compact files, although you won't be able to change the display format of the document or the grays. In TIFF format, you can alter the screen angle, dithering options and proportions of the document.

Mixed Mode. The third, and less common method of scanning is Mixed mode. Mixed mode is useful for certain specialized applications, and for experimenting with ScanMan to produce different effects.

LOGITECH

BAS2509 **ScanMan 32** w/CatchWord Pro **$299.00**
BAS2511 **TrackMan MAC Upgrade** **$69.00**
BAS2510 **MouseMan MAC Upgrade** **$59.00**

ScanMan 32: *Macintosh Plus or better running System 6.0 or later. Hard disk recommended.* ***TrackMan/MouseMan:*** *Any ADB Macintosh running Macintosh, A/UX or X-Windows Operating Systems.*

Prices Pulverized On Quality Hayes Communications Products!

...Now There's No Reason To Settle For anything Less Than The Best!

REVIEWER'S NOTEBOOK: *Hayes modems are legendary for their superior design, engineering, materials and of course, their reliable performance. The vision of Dennis Hayes back in the early 80's has established his company as the leader in communications hardware. But there are two misconceptions here. First, everyone thinks that since Hayes is state-of-the art, that it's more expensive. Not true. Second, everyone also thinks that Hayes makes hardware only. Again, not true. Hayes brings you premium product performance at the same price you'll pay for an off-brand modem. They also produce award-winning communications software products that exploit the power of their modems like no other software really can. In this review, we'll take a close look at the Hayes Pocket 2400 Modem (with Smartcom for the Mac) and the incredible new Smartcom II software. Don't pay high prices for communications hardware/software, buy it from the industry leader at very competitive prices.*

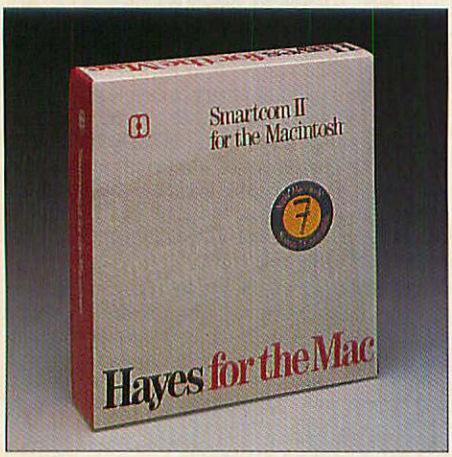
Hayes Smartcom II for the Mac.

The Powerful Communication Software For The Mac.

Smartcom II delivers power and flexibility with a click of the mouse. It is praised by software reviewers and users as the most reliable, easiest to use Mac communications software available. A wide range of features and superior performance make it a favorite among discriminating communicators.

Smartcom II takes full advantage of the power and unique graphics capabilities of all Macintosh computers including special support of System 7, provides support for all popular modems, and offers a simple, but powerful, interface to the advanced features of Hayes Smartmodem and V-series products.

Macintosh Interface. Smartcom II's support of the Macintosh Interface makes operation intuitive. Resizable windows, moveable icons, and color options tailor the program to specific monitors and personal preference. Major program functions are accessed through the Icon Palette and programmable buttons. Graphic Call and File transfer progress displays keep you informed about the progress of a communication session. The Graphics Canvas permits real time exchange of graphic-oriented information that can be manipulated by both parties interactively.



Whether still connected or disconnected, Smartcom II prints on-line text, on-line graphics, or disk files to an ImageWriter or LaserWriter directly or across an AppleTalk network. Smartcom II supports the Hayes V-series Smartmodem 2400M and Smartmodem 2400M (internal modems for the Macintosh II) without sacrificing the use of external ports. Smartcom II also provides enhanced support for non-Hayes modems through user-defined command strings.

Terminal Emulation. Your Mac can take on a new identity and communicate with a variety of other computers and hosts thanks to extensive support of popular terminal types. TTY is an emulator that is commonly used by on-line services or by individual users for exchanging information with other computers. VT52/102 emulation supports most VT 102 keyboard functions, pass-through printing, visual attributes, and other VT 102 features. ANSI is used extensively on BBS systems. Our implementation includes full color and PC graphics support. Prestel is another emulation that supports color and special graphics characters. Show Controls enables you to see the unfiltered data (control codes, escape sequences) in a communications session.

File Transfer. File transfers are fast and easy — just click an icon. File transfer protocols enable you to accurately transfer information between computers. Smartcom II's Communications Documents can store the file transfer methods you select for exchanging data with other computers.

Smartcom II supports variations of XMODEM, a popular error-control fill transfer protocol used by most bulletin boards and on-line information services; select from XMODEM Standard, XMODEM CRC, and XMODEM 1K.

It also supports YMODEM for multiple file transfers and YMODEM-G for high-speed transfers over a modem-to-modem error-control link. ZMODEM supports very fast, highly reliable single or multiple file transfers and can resume interrupted transfers.

Kermit is used in many mainframe environments — large packet and sliding window options increase transfer performance.

CompuServe B Plus provides efficient transfers with this information service and will resume interrupted receives. Text files can be quickly transferred with the Autotype feature or can be sent error-free using either MacBinary II or text format. Received text can be captured to disk, either selectively or in its entirely. "Auto-receive" is supported for MacBinary, ZMODEM, and Compuserve B Plus transfers.

On-Line Operations. Smartcom II has a range of on-line features to help you use the information that your modem brings to your Mac. Communications Documents store communications parameters for transmission speed, character format, ring to answer on, telephone number, speaker volume, and many other settings.

Preset Communications Documents make it easy for the novice to get started, and easy for the experienced user to customize communications sessions. The Peruse Buffer retains the information that crosses your screen for reviewing while on-line or after you've logged off. Selected text can be copied to disk or printed, and the Find option lets you go quickly to a desired location in the text.

Programmable buttons make it easy for you to send commands, autotype text, or start Autopilots with a click of the mouse. An unlimited number of communications documents containing stored phone numbers may be saved. Context sensitive on-line help is only a mouse click away at all times. And Balloon Help is available with System 7.

Communications Control and Automation. Autopilot sequences are used to store keystrokes and instructions you would normally execute manually when communicating. By automating repetitive or complex tasks, Autopilots save you time and money by simplifying and streamlining communications. Create sequences automatically by having the Learn Option watch your actions, or use the icon-based Autopilot Editor to automate any communications task.

Modem Control and Support. Operates with both Hayes and "Hayes compatible" modems and provides a reduced command set option for non-Hayes modems that do not completely or correctly implement the Hayes Standard AT Command Set. In addition, the program supports advanced modem features such as data compression and error-control, and provides flow control options for ultra-fast modem operations such as thos provided by Hayes ULTRA modems for throughput to 38,400 bps.

Advanced Features. Smartcom II offers support for optional user control of Macintosh-to-modem port speed and an increased direct connect speed of 57,600 bps. MultiFinder support enables your Mac to conduct background file transfers. Support for international keyboards, as well as expanded VT102/52 printing commands, enhances the versatility of the program. There's even a menu selection for on-line Voice/Data Switching. Support for connection tools through the Macintosh Communications Toolbox allows Smartcom II to use all connection tools developed for this interface. A Hayes Modem Tool is included.



The Hayes Pocket 2400 Modem.

Tiny little thing... just 2" by 3" (and less than an inch thick), the perfect modem for laptops. Smaller than a deck of cards, the Pocket 2400 contains all the design graces and solid engineering that goes into every Hayes modem. This itsy-bitsy 2400/1200/300 bps communicator comes with everything you need to get underway immediately: includes FREE Smartcom II software, telephone/computer cables, carrying case and ironclad two year warranty. The Pocket 2400 needs no batteries — drawing its power requirements directly from the phone line.

A great on-the-road modem, allows you to access valuable information from on-line services for reports, papers and presentations. Get up-to-the-second information on travel planning to obtain the lowest air fares, hotel and rental car rates. Why buy just any modem when you can have a Hayes?

HAYES

BAS2721 **Pocket 2400 Modem** $149.00

BAS2722 **Smartcom II Communications Software** $93.00

Macintosh computer with 1MB or more of RAM running system 3.2 or later and one 800K disk drive. Stored telephone number capacity is limited only by disk space. Supports LaserWriter and ImageWriter families.

Upgrade Or Switch to Publish-It! Easy 2.1 For Only $99.

The Only Integrated Desktop Publisher Available Today.

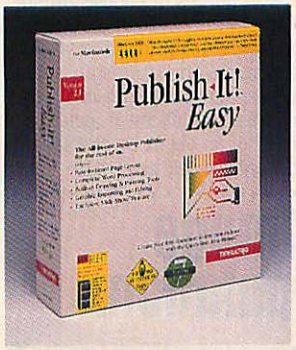
REVIEWER'S NOTEBOOK: *If you're about to enter the world of Macintosh desktop publishing, or if you're an experienced user who wants fast, pro-quality results without dredging through hundred-page-manuals, Publish-It! Easy is the award-winning, System-7 Savvy product that MacWorld magazine calls "...the Swiss Army Knife of desktop publishers". Now for a limited time, you'll be able to switch or upgrade to this 4-and-a-half mice rated package for only $99 — if you currently own a desktop publisher or word processing program. This is a $150 savings off the suggested retail price of $249.95. Simply send us the title page of the DTP or word processing manual you are currently using, and you'll own Publish-It! Easy Version 2.1 for only $99. Publish-It! Easy is also available in the new Corporate Network File Server Version.*

The printed page. It can be an adversary or a joy. If you've got new Publish-It! Easy loaded on your Mac, you'll enjoy the process of laying out a page — and produce handsome newsletters, brochures, catalogs, reports, bulletins, advertisements, flyers, coupons and more! With the toolbox of advanced, easy-to-use features such as The Slide Show (complete with dozens of features and effects, outperforming some stand alone packages!), instant thumbnails (view and edit up to 100 pages), built-in database and mail merge, spell checker and thesaurus, your ideas will look extraordinary on paper as well as on-screen. Draw, paint, edit text, add graphics instantly and use a host of other state-of-the-art publishing tools with sleek controls. In fact, this one program eliminates the need and expense of having separate drawing, painting, word processing mail merge and presentation software — that's how incredibly full featured this package is! And don't worry — Publish-It! Easy doesn't punish you for mistakes or experimentation — it provides 5 levels of Undo to get you right back to the beginning, so you can explore other creative avenues. Print your quality pages on any Chooser-selectable printer.

Unique "What-If" Features. And Publish-It! Easy's unique "What-If" design features makes new and exciting layouts come to life with "Libraries" and "Proxies" that take the mystery and legwork out of the design process. Change type styles or sizes and the text automatically reflows. Headlines instantly fit into the area they're supposed to and subheads tuck cleanly into proper position. Indents are done for you, page numbering and book binding margins are automatically added and more. Publish-It! Easy even handles vertical text justification, aligning text with the top, center or bottom — or any way you like it — with just a mouse click. You can quickly import text from your favorite word processor (including Microsoft Word/Works, WordPerfect, MacWrite I and II, WriteNow and others) — with all type styles and fonts intact! Touch up scanned images with extensive professional tools and import graphics from Adobe Illustrator, MacPaint, SuperPaint, Freehand, FullPaint or any other drawing or painting program with PICT, PICT2, EPS, TIFF or PAINT file formats!

Graphics From Scratch... You can also create your own graphics from scratch with 65 pen sizes, then paint them using an assortment of 32 brush sizes and an airbrush. For typographer-quality text effects, Publish-It! Easy allows you to mix typestyles, sizes and styles in any combination you like — even print grayscale or textured type to create an endless variety of unique effects. Of course, you get precise control of the kerning, leading, stretching, condensing and rotating of your type (in one-degree increments). Pop in a graphic image, and Publish-It! Easy automatically wraps text around it.

Includes FREE File-It Database... File-It is an incredibly useful database and merge program built right in to Publish-It! Easy. Now you can integrate customized information (names, addresses, phone numbers, personal notes, even entire paragraphs) into form letters you create in Publish-It! Easy. It includes three sample databases, seven professionally designed templates and an assortment of mailing label formats, so all you have to do is drop in your data and create a form letter in seconds! Preview your information before you print and retain all of the desktop publishing features (stylized fonts, rotated type, mixed text and graphics) when you create your customized documents. A powerful database takes care of all the details for you, like math, logical "if-then" functions, multiple sort levels and more. A great accessory to Publish-It! Easy that you won't find in other packages.





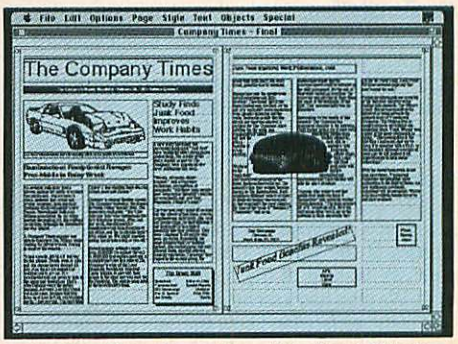
Here's how easy it is!

- **Extensive On-Line Help.** An extensive on-line help system guides you through every command, tool and object at the press of a key.
- **Libraries and Proxies.** Experiment with document design all you want. *Easy's* "Libraries" & Proxies let you alter page layout and type styles instantly — making changes and experimentation easier than ever before.
- **Multiple UNDO Levels.** Lets you UNDO a text mistake you made up to five steps back.
- **Find and Replace.** Instantly change any word or any font, font size or font style throughout your document in a single command.
- **Multiple Windows.** Open, arrange and work on as many documents and windows on your screen as memory permits.
- **Thumbnail Editing.** View and edit up to 100 pages at a time in thumbnail view. You can quickly move elements from one page to another.
- **Layout Aids.** On-screen, movable pica, metric and inch rulers, and a customized alignment grid help to layout your document.
- **Dynamic Time, Date & Page Number Stamps.** Automatically update as you modify your document.
- **Service Bureau Checklist.** Provides all the essential information for service bureaus, such as font list, document size, file statistics, etc.

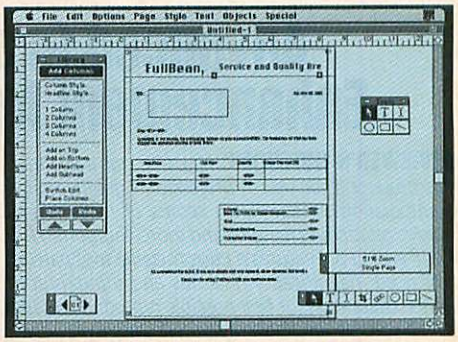
Here's how powerful it is!

- **Full-Featured Word Processing.** You can type, spell-check, and format your documents right from within *Easy.*
- **Dynamic Text Flow.** Watch your text automatically being reformatted as you change the size, shape or location of your text frames.
- **Converts Apple II Word Processor files and Graphic files.** For importing into *Easy.*
- **Slide Show™.** Create and prepare slides, handouts or on-screen presentations. Works in Auto-Repeat or Manual Mode — with your choice of 49 transitions (special effects between slides). *Easy* has all the tools you need to transform your documents into presentations.
- **Spot Color Separations.** Define up to six spot colors and apply them to your text or graphics. Then print them out as spot color separations.
- **Zoom Palettes.** Palettes drop out of sight to give you the maximum working area.

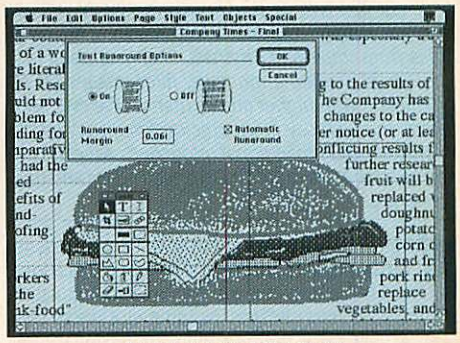
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Page layout fast and easy, with a palette of powerful tools. You can easily view double-page spreads.



Add columns and headlines with sleek menus.



Zoom in or out to adjust details.

TIMEWORKS

BAS2712 **Publish-It! Easy 2.1 (Upgrade or Switch Offer)** $99.00
BAS2470 **Publish-It! Easy 2.1** $135.95
BAS2720 **Publish-It! Easy 2.5** Promotional Pack (One Network Filer Server, One-Node Lan Pack, plus another One-Node Lan Pack FREE) $399.00

Any Macintosh running System 6.0 or later with 1MB RAM.

Create Full 3-D, Photorealistic Images!

REVIEWER'S NOTEBOOK: *MacRenderMan and Showplace (bundled together in this offer) represent the finest software available for 3-D image creation, viewing and manipulation. MacRenderMan allows you to create incredibly realistic images, while Showplace allows you to import those images and create scenes, with complete control of lighting, texture, backgrounds, vantage points and dozens of other effects. Altogether amazing, surprisingly easy and fast. In fact, RenderMan was used in creating the academy award winning film, Tin Toy. Impressive results can be achieved in a short time, but if you get the urge, you can get crazy with these products and never be seen or heard from again...*

MacRenderMan. Fascinating photorealistic design made easy (and fun). Three distinct dimensions in full color, with a variety of surface textures and designs. In our first session, we created several billiard balls with a variety of whacked-out designs and colors in under an hour. That hour passed quickly; most of the real work was handled by MacRenderMan transparently.

We began the modeling process by describing the objects (geometry and appearance), the characteristics of the lighting (the light sources) and the view we wanted of the object (the camera, if you will). We then had a scene! We could change the texture of the surface (and how the light reflects off of it) and easily control the various shading techniques. The more you work on your images, exploring the powerful capabilities of MacRenderMan, the more detailed your images become. This is a great tool for CAD projects, product design, animation, merchandising, architecture and presentation graphics. Nothing else can compare to the images you'll create with MacRenderMan, the most visually accurate picture making product available for the Mac today.

MacRenderMan is used with 3-D design applications that produce RenderMan Interface Bytestream (RIB™) files. Use your favorite 3-D design system to shape objects.



Give images 3-D beauty and realism.

Showplace. Showplace is the forum for your objects created with MacRenderMan technology. Build a dazzling 3-D scene by quickly importing and arranging MacRenderMan images, or choose from the library of Pixar ClipObjects, including furniture, lamps, a sleek racing bicycle, billboard, shopping bag, a theater spotlight and more. Then turn your camera loose and move around your scene to create spectacular effects and perceive a multiplicity of angles.

Change the "look" of an object by changing its surface: you could have an oak grain table and a stucco-painted wall, or a stucco-painted table and an oak grain wall, or an oak grain shopping bag and brushed chrome walls! With Showplace, you can decide the *appearance* of an object independently of its *shape*. Showplace's ability to combine any object with any appearance (including those you create) is one of its most powerful features.



Magnificent pictures, life-like shadows...

ALSO AVAILABLE IN CD-ROM VERSION

MacRenderMan and Showplace applications, complete online documentation for both products, a gallery of images created with Pixar products and a sample of Pixar animation all on one CD-ROM!

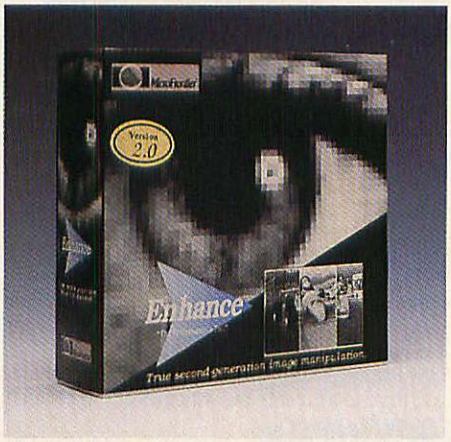
MACRENDERMAN & SHOWPLACE

BAS2410 **Showplace & MacRenderMan Bundle** $635.00
BAS2411 **Showplace & MacRenderMan CD** . . . $435.95

Showplace: *runs on any Macintosh II family computer with a floating-point coprocessor, 32-bit QuickDraw, MultiFinder and at least 5 megabytes of internal RAM (8 is recommended); color display system (for full-color viewing, 24-bit is recommended).* ***MacRenderMan:*** *Macintosh II, IIx, IIci, IIcx or IIfx running Systems tools 6.0.3 or higher; MultiFinder and 32-bit QuickDraw installed; 5 MB of disk storage; 8- or 24-bit color display system; 5 MB of memory (8 MB recommended); RenderMan compatible design package.*

Advanced Grayscale Image Enhancement And Manipulation.

REVIEWER'S NOTEBOOK: *If you've got a scanner, this product is for you. A professional-quality image manipulation product with scores of tools, filters, masks, retouching features and more. Supports TIFF, PICT and EPS. Features a customizable tool palette, advanced magnification features and input/output device calibration for best-possible reproduction. It is a true second-generation grayscale image enhancer, so you have complete control of your scanned images, not just two or three options. Create images that you simply couldn't before—clean, crisp halftones from imperfect originals. Grab just parts of a photograph, create a montage, filter images for reproduction with higher quality than you've ever seen before. In use today by graphic designers, scientists, publishers and professional retouchers. Magnificent anti-aliasing tools to eliminate jagged edges and uneven tones.*



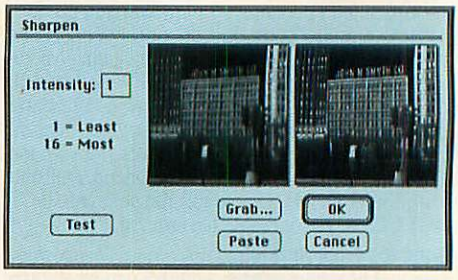
When you get serious about your newsletters, advertisements and other desktop publications, Enhance is the only tool for the job of manipulating second generation images. Nothing else we've ever seen at any price delivers more professional tools (with the ease of use and speed required to make them truly useful) for putting photos on paper. Enhance's toolbox is fully customizable. And, although Enhance was designed to provide the ultimate in black and white image enhancement. No other grayscale image system even comes close.

Using these tools, there are an infinite number of modifications available for any given photo. Blur, sharpen, brush, dropper, edge detection, smudge, masking and more. You can work with any portion of a photo, retouching just the foreground subject or just the background. Eliminate objects, deepen contrast, posterize just a portion of the photo and eliminate unwanted shadows — even lighten shadows.

Create dithered images or convert scanned dithered images to gray scale or vice versa. Create surrealistic effects by combining blurred or smudged backgrounds with razor-sharp foreground images. The toolbox functions are familiar to those in your paint program, but include far-reaching capabilities that provide unlimited effects. The feathering feature allows you to create soft-edged images and the Fringe option allows you to create spectacular borders.

Images can be scaled, rotated, resampled, aligned, cropped, cloned, flipped, stretched, slanted, distorted and displayed in a variety of perspectives. A few moments of experimentation with the Enhance filter set will be an engaging experience. Create line images from photos, clean up blurry originals, posterize and emboss images, equalize images for perfectly even grayscales. There are simply endless numbers of combined effects.

The manual is excellent, providing a quick education on the construction of photographic images, how to scan them for top-notch results and how to quickly calibrate your scanner and output device to make the most of their abilities. You'll learn about the nature of grayscale, how it can be manipulated and improved. The difference between halftoning and dithering, and when to use each in your work. Using Enhance, you can create your own images, or manipulate any existing image created on a scanner, video digitizer, or virtually any other source.



ENHANCE

BAS2447 **ENHANCE** $230.00
Macintosh SE30, LC or Macintosh II family of computers with 2 MB RAM; 8 bit color video card with gray scale or color monitor recommended.

The Industry's Only Continuous Hard Disk Backup.

REVIEWER'S NOTEBOOK: *Ordinary backup systems make periodic backups of your data to a tape or floppy, and that's fine; but DiskTwin offers you automatic, continuous backup protection (great for workgroup servers, because it's transparent while AppleShare runs). That means up-to-the-instant data backups (from primary disk to secondary disk) without any effort at all. Just install DiskTwin and never worry about it again. Another important advantage: DiskTwin features Automatic Cutover, which keeps your Mac on-line during a disk failure, seamlessly switching you to the second disk. And with DiskTwin's parallel SCSI buses, you don't suffer any performance loss! DiskTwin was awarded an honorable mention as storage product of the year in the MacUser* Eddy *awards. It also received four-and-a half mice in their November issue.* 4½

You can avoid the most horrifying scenes with an ounce of prevention. It's called DiskTwin, and it could save your life in the event of ... well, the unspeakable. Available either as a NuBus card to fit the Mac II family or SE/30 version (and accompanying software), DiskTwin gives you a constantly updated backup, so there's no data loss between backups. It is automatic and completely transparent, so you'll never forget to use it. It is also AppleShare® compatible so it preserves all access privileges. And since DiskTwin uses any standard Macintosh SCSI drive, there's no reformatting or need to update drivers. Thanks to advanced parallel data paths, DiskTwin does not slow down your computer at all. In short, DiskTwin is a simple, powerful backup system for the Mac that always protects 100% of your data.

The automatic cutover feature actually keeps your computer up and running — right through a disk failure — without any loss of data! DiskTwin simply moves you to the twin disk. You (and your workgroup) continue to work without interruption. The failed disk can be repaired or replaced at any time. Once repaired, the speedy restore function takes control of the recovery process, rebuilding data with lightning speed. Once it restores the data and your disk is operational, DiskTwin returns to its continuous backup duties.

On servers, DiskTwin is the great protector, keeping them on-line through even the most serious interruptions. DiskTwin's mail notification is ideal for unattended or "headless" servers. DiskTwin will actually send an error message through Microsoft Mail or QuickMail to the System Administrator. So that's the most alarming thing you'll ever have to face again — a message saying you need to repair your hard disk. Never again will you lie awake at night wondering if you'll go to work in the morning only to come face to face with the most dreaded computer catastrophe of all, a totally dead and decimated hard disk.

And DiskTwin doesn't require server shutdown to backup continuously or for archival backup. It's compatible with all file sharing, e-mail, database and other workgroup software.

Use DiskTwin with a SyQuest or Bernoulli removable drive and you'll have the best of both worlds: continuous, interruption-free protection from hard disk failure, plus archives of your valuable data for storage or for rotating backups.

Thanks to DiskTwin's exclusive hardware you can pair up to 7 hard disks on one computer. With no loss of speed or performance! All that plus automatic, seamless switch-over makes DiskTwin the perfect server solution.

What? Your hard disks are different sizes? Well, DiskTwin comes prepared for that too. With PartitionTwin, you can partition your hard disk into smaller parts and backup just one part (perhaps just your data, without the space-consuming applications). For example, you could twin an 80MB partition on a 330MB primary disk to an 80MB twin disk. And the best part is PartitionTwin is included free with DiskTwin.

DiskTwin Scenario #1 — AppleShare/E-Mail Server. Acme Widgets uses an SE/30 AppleShare server with an 80mb internal hard disk for a customer database and QuickMail. How can Acme's network administrator protect her company from losing all of its customer records when a disk crashes and eliminate downtime from a busy workday?

The DiskTwin Solution. Using DiskTwin with a removable cartridge drive, the administrator can keep both an archive of the entire 80mb server disk and an up-to-instant backup. Every evening, she removes the twin cartridge for safekeeping and replaces it with another. By exchanging cartridges daily, the administrator has both continuous server backup and an archive that's immediately usable, unlike a tape or floppy backup.

If Acme's server disk crashes, DiskTwin automatically cuts over and continues operation from the cartridge disk, preventing downtime and the loss of the day's work. Users continue working uninterrupted, unaffected by the disk crash. DiskTwin's QuickMail Notification sends an e-mail to the administrator and other designated users, warning them that a disk has failed. The crashed disk can be repaired or replaced at a convenient time.

Scenario #2 — Individual User. An illustrator uses a Macintosh IIci with a 330MB disk plus a 40MB external to create large images for a daily newspaper. At any one time, he has about 40MB of current projects on his disk. From time to time he does a copy of key files from the 330MB disk to the 40MB disk. It takes a long time and he has to constantly remember to do it. The illustrator has learned to live with tight schedules, but his Mac has not. How can he insure that he never misses a deadline?

The PartitionTwin Solution. Simply by adding the DiskTwin system to his existing configuration, the illustrator can keep a continuous backup of his current work. He can twin a 40MB partition from the larger disk to the 40MB disk, using PartitionTwin. He keeps all his current projects in the partition on the big disk and as he works on them, DiskTwin automatically maintains a complete backup. If his larger disk ever fails, he has a ready-to-use backup.

DiskTwin gives you:

- Continuous, Up-To-The-Instant Backup
- No Data Loss With Hard Disk Failures
- Background Operation/Totally Transparent
- Fully AppleShare Compatible
- Uses Any Standard Mac SCSI Disk Drive
- No Performance Loss or Slow Down
- Fits Any Mac II, SE/30 or Quadra

"A godsend for network managers concerned about downtime." *-MacWorld Magazine*

Backups On A Budget. Sure, DiskTwin is the perfect solution for AppleShare, network servers and power-users. But what about the individual user who wants the same level of protection (for not a lot of money)?

Introducing TwinIt, the software-only version of



DiskTwin. TwinIt was designed for the single user in mind. TwinIt delivers all the important features like up-to-the-instant backups totally in the background while you continue to work, but without the added cost of extra hardware. And instead of DiskTwin's automatic switch-over and e-mail error messages, TwinIt produces an onscreen error message prompting the single-user what to do next. That's it. All the other big benefits like AppleShare and System 7 compatibility are still there. You get full 100% continuous backups of all your valuable data. Plus there's also a big advantage for TwinIt; because there's no hardware board to add — it can run on *any* Mac.

One Formatter/Manager For All Disks. If you work with different makes of hard disks, you know the problem. Each brand of SCSI hard disk has their own software, and sooner or later you end up with something that's incompatible. Before, all you could do was continue to buy the same brand of hard disk (even if the competition was cheaper and better). But now there's a solution, DiskMaker — the Universal SCSI Disk Formatter and Manager.



DiskMaker is powerful but easy to use, even for the novice. Subdivide your disk into partitions for better performance and security. Password-protect individual partitions and write-lock them to prevent accidental deletions. Override individual volume passwords (if someone forgets theirs) using the master password. Eject a removeable disk, insert a new one and it appears on the desktop automatically without restarting.

Of course, DiskMaker is fully System 7 compatible and supports 32-bit Addressing and Virtual Memory. But the important fact is that it eliminates disk software incompatibility and allows you to shop around and buy disks from any source.



GOLDEN TRIANGLE

BAS2430 **DiskTwin**	$695.00
BAS2431 **TwinIt**	$175.00
BAS2432 **DiskMaker**	$65.00

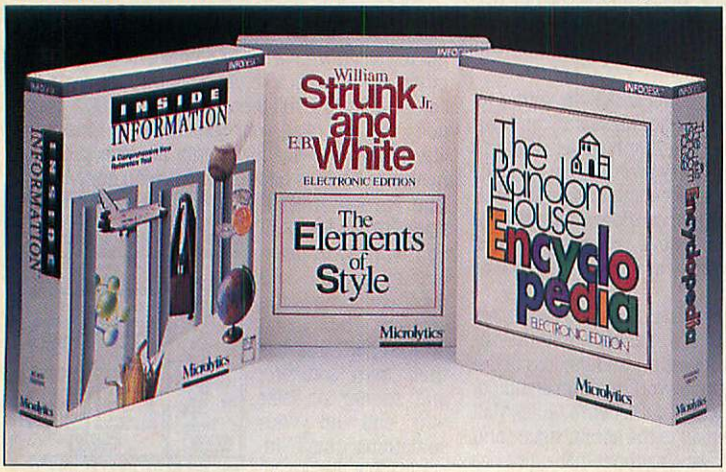
DiskTwin: *Macintosh SE/30 or II series but Apple NuBus or PDS adapters required for IIsi; System 6.0.4 or later; SCSI twin disk; no minimum memory requirement.* ***TwinIt and DiskMaker:*** *Macintosh Portable, Plus, SE series, or II series; System 6.0.4 or later; SCSI twin disk (TwinIt only); no minimum memory requirement.*

A World of Information on Your Desktop!

REVIEWER'S NOTEBOOK: *The INFODESK series is an important milestone in reference software. Three classic works are now available for the Macintosh. Each contains a wealth of current information, arranged for easy location and accessed through the powerful INFODESK engine. You'll use these titles often. They're fun to just browse through!*

Random House Encyclopedia. The best-selling encyclopedia that puts a full-blown reference center right on your Mac! Simple and fun to use — without a CD-ROM player. Ideal for students, professionals, researchers, writers and makes a wonderful gift for anyone. Just click to explore History, Geography, Philosophy/Religion/Mythology, Social Sciences, the Arts, Science, Sports and Leisure, Law, Government and more.

Using the powerful, built-in search and retrieval tools, you can see a quick overview of Chinese history, the advent of computers, facts about Romanian agriculture or learn how a nuclear power plant works. Click on Sports and learn about Ty Cobb, Hank Aaron and the immortal Babe Ruth. Click on Science and travel back to July 20, 1969 and Neil Armstrong's historic moon walk. Click on Arts and Music and Instruments to travel through the careers of Elvis, the Beatles and others. Click on Government and explore the lives of George Washington, Thomas Jefferson, JFK and others. It's fast, easy and fun — ready to go right out of the box.



Inside Information. This new Desk Accessory is a comprehensive reference tool which organizes the English language into logical Categories of defined words. Far more than a dictionary or thesaurus, INSIDE INFORMATION lets you quickly and easily explore any of seven general Classes: Nature, Science & Technology, Domestic Life, Institutions, Arts & Entertainment, Language, and The Human Condition. These Classes contain 20 Subclasses, 125 Categories, and 700 Subcategories.

Categories are defined by subject matter, such as Chemistry, Law or Music — or by a common property, such as Colors, Tools, Verbs of Motion — or even a specific usage, like Insults, Slurs & Epithets.

Dig deeper into each Class in three different ways: outline view, graphic view or tree view. The reverse dictionary lets you type a few descriptive words, then see a listing of appropriate terms and definitions. Inside information is a great all-around tool — and an ideal argument-ender!

Strunk & White's Elements of Style. Reviewers have called it "...the best of its kind" and raved, "The work remains unparalleled, direct, correct and delightful." Now **The Elements of Style** is available for your Apple Macintosh or IBM PC compatible computer.

Based on an original work by William Strunk, Jr., a Professor of English at Cornell University, this updated third edition, prepared by noted writer and grammarian E.B. White, has become a classic of conciseness. It's the ideal tool to make your writing crisp, succinct and powerfully effective.

Anyone who needs to communicate effectively in writing will find *The Elements of Style* packed with specific, pertinent examples to improve writing style and structure. It's an easy-to-access educational reference work for the rules and principles of correct English usage. Includes seven rules of usage, eleven principles of composition, several matters of form, a list of often misused words and a style guide.

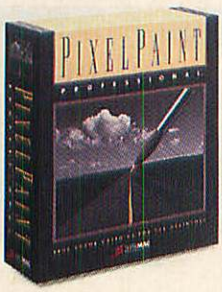
RANDOM HOUSE

BAS2350 **Random House Encyclopedia** Mac	$65.00
BAS2000 **Inside Information** Mac	$65.00
BAS2600 **Elements of Style** *Mac*	$59.00

Hot Studio Color!

The Finest Graphics Cards, Color Displays, Digital Video Capture and Pro Paint Software... SuperMac is the source for color.

PixelPaint Professional: High-powered, graphics-oriented tools for the advanced user. Version 2.0 includes a broad array of paint capabilities along with extensive photo manipulation and enhancement features. Open dozens of individual windows and cut/paste images and elements between them, streamlining the design process. Move quickly to create new layouts — PixelPaint Professional can keep up with your fertile imagination! The tools are magnificent; create shapes, fine-tune location and boundaries. The brush and paint tools allow instantaneous changes in line width, angle adjustment, Bezier curves and scaling the overall size. Quick zooms give you precise image control, clone artwork with the advanced rubber stamp, define the colors you want—to create just the exact picture you had in mind.

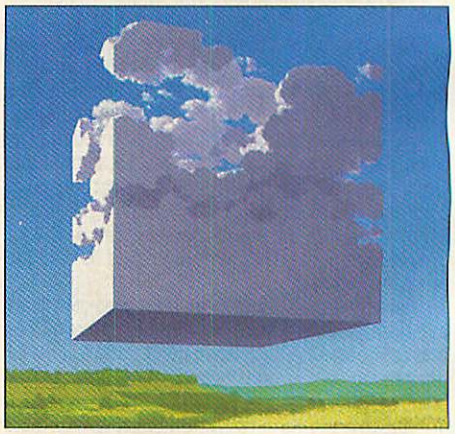


SuperMac VideoSpigot and VideoSpigot Pro: VideoSpigot and VideoSpigot Pro are SuperMac's digital-video grabbers, for use with Apple's QuickTime in making incredible animated sequences and Mac movies. It's fast and easy, great for a variety of in-house productions. VideoSpigot Pro gives you the ability to use large-screen display images with breathtaking results. Using these precision crafted boards (and accompanying software) turns your Mac into a soundstage, ready to capture vivid full-motion video — all fully digitized. Capture live video by quickly connecting to a VCR, laserdisc or video camera. Even if you've never put a video production together, VideoSpigot puts you in the director's chair. The VideoSpigot Pro contains greater speed and delivers 24-bit color on 12" and 13" displays. It's the graphics power tool for the hot design shop. Call us for more information on the VideoSpigot and new VideoSpigot Pro.

The SuperMac 19" SuperMatch Display: A new standard for designers and production use. The super performer, complete with color-matching capabilities, breaks technological ground with an extended color range and the accuracy of a natural white point (a neutral point that determines other colors) for true, WYSIWYG color reproduction.

The SuperMac 19" Platinum Series: Four times the display area of a standard Macintosh, the 19" Platinum is ideal for the exacting needs of business documents and gray-scale publications. Pinpoint-precise image accuracy and screen reproduction, includes flicker-free technology, white-point phosphor reference and OCLI antiglare filter.

THE COLOR ITSELF: The SuperMac line of graphics cards explodes with rich, brilliant color — bringing 100% display accuracy to any project. The Spectrum Series has a board for every Mac and delivers spectacular results for artists, designers and illustrators. There are three 8-bit boards to choose from, the fastest you've ever see: three 8•24-bit speed demons and a 24-bit monster that's the envy of the industry.



SuperMac Graphics Cards	
BAS2475A **Monochrome**	$395.95
BAS2475B **Spectrum/8 si**	$795.95
BAS2475C **Spectrum/8 LC**	$795.95
BAS2475D **Spectrum/8 Series III**	$795.95
BAS2475E **Spectrum/8 24 PDQ**	$1095.00
BAS2475F **Spectrum/8 24 PDQ si**	$1095.00
BAS2475G **Spectrum/24 Series III**	$2395.00
SuperMac Graphics Displays	
BAS2476A **19" Platinum Display**	$1095.00
BAS2476B **19" SuperMatch Color Display**	$2095.00
SuperMac Digital Video	
BAS2478A **VideoSpigot si**	$395.00
BAS2478B **VideoSpigot LC**	$395.00
SuperMac Pixel Paint Software	
BAS2477 **PixelPaint Professional**	$495.00
BAS2479 **PixelPaint (Regular)**	$155.00

Requires System 6.0.5 (6.0.7 for VideoSpigot) or later with 2 MB or more of RAM, a hard disk with at least 3 MB of free space, an 8-, 16-, 24-, or 32 bit video card, and a color or grayscale monitor.

Additional SuperMac products available, please call.

THE SHARP WIZARD MISUNDERSTANDING!

REVIEWER'S NOTEBOOK: *It all started a couple of years ago. From sharp minds came the fabulous little organizer that had the potential to change the way busy people take care of their information. It offered all the power and functionality of the Mac — in a fast, capable little package about the size of an ordinary checkbook. It offered an extra wide 40 character by 8 line screen for a wider view, a QWERTY typewriter-style keyboard, up to 128K of memory, "one-button access" to any of its built-in features, the ability to run spreadsheets, compatibility with IBM and Macintosh desktop computers, a slew of personal organizational tools — all running on standard CR-2032 batteries.*

But everyone thought it was just an electronic notepad. That's like saying the Stealth bomber is just an airplane. The fact is, The Wizard is a serious business machine. Sure, it's a great place to put all of your "gotta-have-it-now" information; phone numbers, addresses, appointments, expenses and strokes of brilliance — and a built-in word processor — but that's just the beginning.

Designed to Do What Your PowerBook Can't. The Wizards from Sharp are sophisticated, powerful computers designed specifically to organize all of your personal information. Whether you're jotting down names, numbers and expenses or creating 3-D charts and downloading spreadsheets. Its power has been allocated to fast, easy collection, storage and retrieval of anything. The Sharp Wizard delivers the ultimate in portability.

The Wizard focuses on the fundamentals. Like an extra wide, super-crisp screen which allows an impressive 40 character by 8 line view. The display is the single most important feature in any small computer, and nothing I've seen compares to The Wizard. I love the way each key is exactly where you'd expect it to be. Search with one stroke, perform any task by just touching an icon. The Wizard's keyboard is tight and responsive; the keys are crafted from superior materials.

Hold it in your hand — you'll see and feel the attention to precise detail. The Wizard is deceptively light and superbly balanced, with a mar-resistent case that can handle life on the road.

I've been using a Wizard OZ-8200 for a number of months now, and I can tell you that it fills a big need in my business life. I used to carry a Macintosh Portable and quickly realized that I spent too much time babysitting the thing, along with all of my programs, files and diskettes. What I needed is something much smaller and lighter, yet fast and powerful. I carry my Portable sometimes — but my Wizard is always with me. Unlike my Portable, which requires booting-up, opening a word processor or note pad, the Wizard requires just one keystroke and is ready to receive my thoughts.

With the software now available for the Wizard, I can run spreadsheets, create finished documents, organize my expenses, communicate with my desktop back at the office or my Mac at home — even send faxes and play a few furious rounds of Hatris or Box Jockey! I've also quit carrying my pocket tape recorder to record ideas and memos — the Wizard does it better.

When you think about it, a Portable is often overkill for road trips — what you need on the road is a small, fast, convenient machine designed to gather information now. The Wizard is the perfect answer, providing all the functionality of a Mac with an optional spreadsheet, memo pad and other amazing organizational tools. Just touch an icon and the Wizard is ready to go! The Wizards feature huge (40 character by 8 line), super-crisp screens, solid QWERTY keyboards, full compatibility with your desktop Macintosh or PC — and with the new OZ-8200, you'll pack 128K of memory!

The Wizard does so much more. The real news is that the OZ-8200 128K Wizard is in stock and ready to ship. With this powerhouse in your briefcase, you're ready to do just about everything you do on your desktop Mac or PC. And the Wizard's sleek design makes it the perfect traveling companion (unlike the excess baggage of a laptop or notebook). It's about the size of a checkbook, weighs almost nothing and runs on standard CR-2032 batteries.

The misunderstanding continues. Pop in the Wizard Money Planner software card and your Wizard becomes a powerful (and full featured) financial calculator. The North American City Guide includes over 12,000 detailed entries about 23 cities: New York, Miami, San Francisco, Toronto, Montreal, Los Angeles, Atlanta and more. The 8-language translator helps you with words and word phrases in several categories: air travel, sightseeing, hotels, restaurants and more. The spreadsheet software is 1-2-3 file compatible and the thesaurus/dictionary contains over 42,000 words and 500,000 synonyms. Oh, and by the way, if you get a free moment, slip in Tetris, Hatris, Box Jockey or Backgammon for some fast-paced fun!

An Organizer for Every Career. Three models are available: The 7000 Organizer Series, The 5000 Organizer Series and the incredibly powerful 8000 Wizards. Each is packed with built-in features, great looking screens, and expandability to a fax, a modem — even to your Mac or PC. With an Organizer or Wizard you're never alone. You get performance without all the little inconveniences.

Organizer Accessories. There's an optional modem, printer, fax and a slew of software cards that turn the Wizard into a fully funtioning office, so you can conduct business anywhere. With the Mac Link cable, you can download information from your Mac to your Wizard and have up-to-the-second information when you take it on the road. There are several models to choose from, one for your style of business. It's flexible.



Pictured: The Sharp 8000

Expand The Sharp's Mind. When you add software and memory cards to your Wizard (7000 & 8000 series only), you put all kinds of possibilities at your fingertips. Memory and applications simply slide under the touch-sensitive screen which acts as a keypad to perform tasks, open applications, and more.

Time Expense Manager. The powerful way to manage and prioritize your schedule, track your expenses and deadlines, and account for time spent on projects or client meetings.



Spreadsheet. Create fully functional, Lotus 1-2-3 file compatible, 26-column-by-999-row spreadsheets on your Wizard, or download a spreadsheet from your Mac! This card will hold 64K of data! Built-in features include: 10 templates, complete formatting, sorting and "freezing pane" functions, math and financial calculations, spreadsheet-linking capabilities, cut & paste and more.

Money Planner. Turn your Wizard into a full-featured, highly powerful financial calculator. Loans, interest rates, depreciation and statistical analysis — or program your own equations! Change one value and all affected values automatically change.

North American City Guide. Includes over 12,000 detailed entries from 23 North American cities: New York, Los Angeles, Chicago, San Francisco, Atlanta, Montreal, and more.

The Organizer Bible. Contains both New and Old Testaments from the King James version Holy Bible. Instantly go to any Book, Chapter or Verse.

8-Language Translator. Translate words and commonly used phrases in English, Chinese, French, German, Japanese, Italian, Swedish and Spanish.

Tetris, Hatris, Box Jockey, Backgammon. From the Soviet Union comes Tetris. The all new Hatris, where you must position falling hats on top of each other. And Box Jockey challenges you with over 130 mazes — each one more difficult.

Thesaurus Dictionary. Over 42,000 definitions, 500,000 synonyms, and an 87,000 Spelling Corrector. Can even be used with any of the Wizard's built-in modes.

Something for Nothing! Buy a Wizard OZ-7200, OZ-8000 or OZ-8200 and **get a handsome Leather Case and Video Guide FREE!** *(a $69.98 value)* Buy any 2 software cards — **get 1 software card FREE** *(must be of equal or lesser value)!*

BUY THE OZ-7200 SHARP WIZARD— GET MAC ORGANIZER LINK AT 50% OFF!

SHARP WIZARD

BAS6310	**ZQ-5200 Sharp Wizard**	$199.95
BAS6311	**OZ-7200 Sharp Wizard**	$239.99
BAS6312	**OZ-8000 Sharp Wizard**	$299.99
BAS6309	**OZ-8200 Sharp Wizard 128KB**	$399.99
BAS6313	**Organizer Modem**	$179.99
BAS6314	**Organizer Talk** (OZ-7000 series only)	$99.99
BAS6315	**Organier Fax/Modem**	$499.99
BAS6320	**Time Expense Manager**	$119.99
BAS6321	**Dictionary/Thesaurus**	$129.99
BAS6322	**8 Language Translator**	$99.99
BAS6323	**Money Planner**	$99.99
BAS6324	**Spreadsheet II**	$179.99
BAS6325	**Scientific Computer Card (7000 series)**	$109.99
BAS6317	**Scientific Computer Card II**	$109.99
BAS6326	**North American City Guide**	$79.99
BAS6330	**Box Jockey**	$49.99
BAS6331	**Organizer Chess**	$109.99
BAS6332	**Tetris Game** (7000 series only)	$49.95
BAS6318	**Hatris Game** (8000 series only)	$49.95
BAS6319	**Backgammon Game (7000/8000 series)**	$49.95
BAS6333	**Organizer Bible**	$149.99
BAS6340	**Portfolio Card**	$129.99
BAS6341	**32K RAM Card**	$79.99
BAS6342	**64K RAM Card**	$129.99
BAS6345	**128K RAM Card** (7200/8000/8200)	$149.99
BAS6346	**Mac Organizer Link**	$109.99
BAS6347	**IBM Organizer Link II**	$129.99
BAS6350	**Leather Case (OZ-7000 series)** *(Reg. $34.99)*	FREE w/OZ-7200
BAS6351	**Leather Case (OZ-8000 series)** *(Reg. $34.99)*	FREE w/OZ-8000 or 8200
BAS6399	**Video Guide** *(Reg. $34.99)*	CALL!
BAS6352	**Battery Pack (for OZ-8000 series)**	$34.99
BAS6353	**Printer**	$169.99
BAS6354	**Dubbing Cable**	$29.99

Want To Learn A Foreign Language?



REVIEWER'S NOTEBOOK: *Learn Spanish, French, German, Japanese, Italian, Chinese or Russian with the foremost language tutoring system in the world: Hyperglot. If you've ever studied a language before (and want a fast, easy way to refresh), need to learn a new language for travel or business, or even if you've never attempted a second language, this series combines the power of your Mac with the most extensive materials available. Digitized voices of native speakers provide pronunciation lessons while grammar, vocabulary and phrases are at your fingertips. Hyperglot also offers the industry's most respected Japanese-language software.*

Business today is setting its sights on global expansion as European and Asian markets explode. Communication is a critical aspect of success in these new territories. With Hyperglot's series of foreign language software, you can learn to speak and understand languages of the important countries of the world with less effort and almost instantaneous results. If you're a traveler or student, exploring a new language is fast and fun with Hyperglot's digitized speech and logical progression.

Pronunciation Tutor (Available for Spanish, French, German, and Chinese): The Pronunciation Tutor is packed with over 2 megabytes of high-quality, digitized sounds, consonants, words, phrases and full sentences. Just click on the syllables, words and sentences; a native speaker repeats them as many times as you need. The Pronunciation Tutor includes an extensive set of notes throughout the stacks — a great aid to understanding as you move through the lessons to expand what you're seeing on the screen. Just click at any time for more information, clarifications and examples. Unusual sounds, pronunciations and inflections are explained with easy-to-understand notes and digitized sounds are available at any time. And of course, translations are available with a mouse click.

Verb Tutor (Available for Spanish, French, German, and Russian): Hyperglot's series of Verb Tutors include extensive verb drills that provide a thorough understanding of these languages as spoken. 200 sentences, recorded by native speakers, drill you on 20 frequently used verbs. Check conjugations of all tenses of the verb being drilled, see an instant translation, get a quick briefing of the rules for tense usage, check your answers and see a complete explanation. Ideal as a first- or second-year course in any of the featured languages. Also great as a review or meaningful refresher course.

Word Torture (Available for Spanish, French, German, Russian and Italian): A complete, automated vocabulary drill with up to 1600 words and their translations. You can type the answers to questions posed by the system or use the speedy flash card format for drills. Word Torture will automatically re-test you on missed answers and you can create drills of any size you like for self-paced learning. Drill from Spanish, French, German, Italian, or Russian to English or vice versa. (Incidentally, these products are excellent as an aid to English as a second language.) Create your own drills, see the words in random order and create your own customized vocabulary sets.

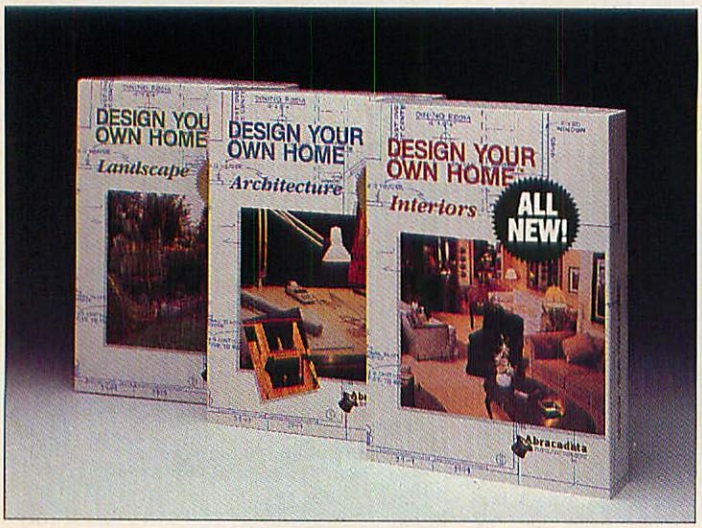
HYPERGLOT LANGUAGE SOFTWARE

BAS2480S	**Spanish Pronunciation Tutor**	$34.00
BAS2481S	**Spanish Verb Tutor**	$38.00
BAS2482S	**Spanish Word Torture**	$34.00
BAS2480F	**French Pronunciation Tutor**	$34.00
BAS2481F	**French Verb Tutor**	$38.00
BAS2482F	**French Word Torture**	$34.00
BAS2480G	**German Pronunciation Tutor**	$38.00
BAS2481G	**German Verb Tutor**	$38.00
BAS2482G	**German Word Torture**	$34.00
BAS2483A	**Japanese: KanjiMaster**	$98.00
BAS2483B	**Japanese: EasyKana**	$64.00
BAS2482I	**Italian Word Torture**	$34.00
BAS2484	**Russian: Introduction**	$28.00
BAS2484R	**Russian Word Torture**	$38.00

Memory requirements vary. Call for details.
Other language teaching aids available.

Design Your Dream House on Your Macintosh

Go ahead — design that new addition to your home! Put your imagination to work on the interior, then plan the perfect landscape. Experiment with different layouts, colors, shapes and arrangements with the Design Your Own Home Series. It's fast, easy and fun — the results are clean, precise and professional. It's your home, who could design it better than you?



These three simple-to-use computer aided design systems include dozens of sample floorplans, predrawn furnishings, plants, flowers, trees and shrubs. You can modify plans to suit your taste, or start from scratch to create just the environment you've been dreaming of. The Design Your Own Home Series is fast and easy — yet contains enough power for professional use.

ARCHITECTURE. You can create a designer home right on your Macintosh. Instantly draw floorplans, building side views and structural details. Rearrange your ideas, add notes and labels. Design Your Own Home automatically calculates distances, areas and angles, and uses all appropriate standard architectural scales. There's a complete library of pre-drawn architectural shapes and symbols — choose windows, doors, stairs, bathtubs and more. Add color overlays of electrical systems, plumbing plans. Use stud tool to speed drawing and aid in lumber estimates.

The program includes: grids, snap lines, stud/beam repeaters, text, circles, ellipses, boxes, arcs and more. Perfect for home, school or professional use.

INTERIORS. Bring your own unique interior design ideas to life with Design Your Own Home Interiors. This remarkable system is easy-to-use yet extremely powerful. Arrange furnishings and they're automatically kept to scale! Explore the possibilities of color, texture and experiment with wallpaper. Select from dozens of pre-drawn furnishings and shapes, and modify plans quickly and easily.

LANDSCAPE. Ask any real estate professional, they'll tell you that landscaping can significantly increase the value of your home. In any given neighborhood, two identical homes may sell for many thousands of dollars difference — simply because of the care taken to enhance the look of the property. Whether you do the work yourself or hire a landscaping firm, you must plan a landscaping project carefully to achieve great results. Design Your Own Home Landscape allows fast, easy planning with a variety of useful tools. First, flip through dozens of sample plans included. You can use them as is, with modifications or just as ideas to create your own plan. Change the placement of trees and shrubs to put shade in the right places, arrange plants, steps and walks exactly the way you want quickly. You can even "age" trees, shrubs and plants to see how they'll look when matured.

Take a look at what you've designed from a variety of views: overhead, side, north, south, east and west perspectives. Then, see a detailed list of everything you've "planted" for accurate pricing. Includes library of trees and shrubs.

TIGER SPECIAL OFFER

BUY ALL 3 – SAVE $30.00!

DESIGN YOUR OWN HOME

BAS2001	**Architecture**	$63.00
BAS2002	**Interiors**	$63.00
BAS2003	**Landscape**	$63.00

Requires 1MB or more; mouse, ImageWriter, LaserWriter.

The Intelligent Desktop

REVIEWER'S NOTEBOOK: *Although OnCueII contains several individual features (each of which could be standalone products), one in particular caught our eye as an incredible time saver: KeyLauncher. It allows you to launch any application from the keyboard, without opening layers of folders — by simply typing all or part of its name! That one capability can save an incredible amount of time by eliminating time-consuming steps. It's worth the price of OnCueII alone — but there's much more...*

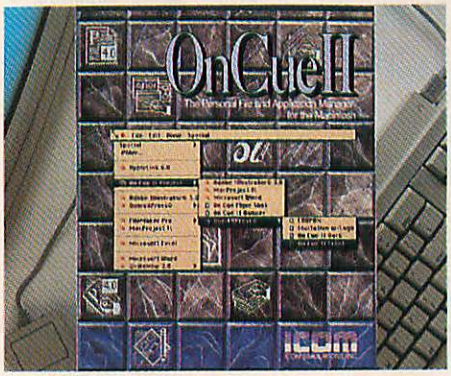
OnCueII satisfies the power-user in us as elegantly as it satisfies our need for easy-to-use utilities that perform as promised and increase productivity. So it's great for anyone. In seconds, you can personalize your menu configuration for maximum speed and efficiency. Just click to open an application, group documents together that will be used for a specific project, return to work on a recently-used document by retrieving a list of up to 100 files you've used, and launching any of them immediately. No other file and application manager gives you this degree of functionality. There's even a cure for the "missing application" message using OnCueII's unique MatchMaker feature. With it, you can launch files that have missing applications by assigning another application — any one you choose!

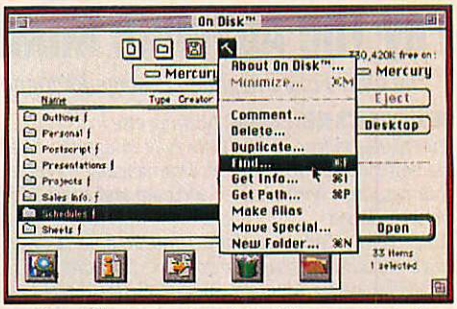


OnCueII also provides powerful, easy-to-use tools to help you instantly find seemingly lost files. You can conduct blistering fast searches by file name, file format (TIFF, PICT, etc.), creator application, dates created or modified, file size or any combination. With this powerful search feature on your side, you'll never misplace another file. Guaranteed. And with OnCueII's amazing file management capabilities, you'll be able to instantly find, get info, copy, move, delete, and rename files/folders from within any application — and without using the Finder. It doesn't get any more convenient than that.

And there's more! The On Startup feature gives you complete control of the programs that load when you turn on your Mac, like system extensions and control panels. You simply define the priority and groupings and OnCueII takes care of the rest.

All of which makes OnCueII one of the most important new products to come along in years, giving you capabilities you've probably wished for but never thought possible. And we've just scratched the surface of OnCueII's vast potential: it contains ten other time-saving features that users have screamed for. It's one product that does it all.





Instant file management — from within any application! Find, get info, copy, move, delete, even rename files or folders without using the finder!

Eliminate time-consuming steps with the following versatile features:

- **On Cue II.** Instantly launch any file or application, or simultaneously launch a group of files and applications — without opening layers of folders — all with a single mouse click.
- **MatchMaker.** Conveniently launch files that have missing applications by assigning another application of your choice.
- **File Search.** Quickly locate files by using the following search criteria: file name, file format, creator application, dates created or modified, file size, or any combination of these criteria.
- **On Startup.** Easily manage programs that load when you turn on your computer (e.g., system extensions) by defining the priority and groupings in which these programs are loaded.

...Plus 13 other time-saving features!

ONCUE II

BAS2400 **OnCueII** **$55.00**
Any Macintosh computer running System 6.0.4 or later with at least 1MB RAM.

Full-Motion, Interactive Sherlock Holmes Mysteries!

Over 90 Minutes Of Adventure On One CD!

REVIEWER'S NOTEBOOK: *An absolute must for electronic game fans, Sherlock aficionados and deductive-reasoners! Sherlock Holmes, Consulting Detective is the only game we've ever seen that features FULL MOTION VIDEO. You actually interact with the on-screen characters, embarking on three different cases with the super-sleuth himself, along with Watson and an intriguing collection of victims, suspects, generals, beautiful women and jealous sisters. It's a fascinating new technology. The sound is incredible, taking advantage of your MAC's full capabilities. Hours of fun and intrigue. The cases are well written adaptations of characters licensed from the Sir Arthur Conan Doyle estate. You interact with the characters. Your interrogations lead to valuable information and the evidence you uncover leads to clues needed to help Scotland Yard nab the villainous murderer. Members of the Tiger staff first saw this disc at the CD-ROM Expo in San Jose last summer. We knew then that this one was destined to become a classic. If you've got a CD-ROM reader, you'll love it. This multimedia, full-motion blockbuster is worth it!*

3 EXCITING MYSTERIES!



FULL MOTION VIDEO!

For the first time ever, over 90 minutes of full-motion video brings Sherlock Holmes to life. This revolutionary CD gaming experience lets you match wits with the super-sleuth himself. Guide Sherlock and Watson through the streets of London to interrogate suspects and solve three intriguing murder mysteries! Just slip in the CD and go to work.



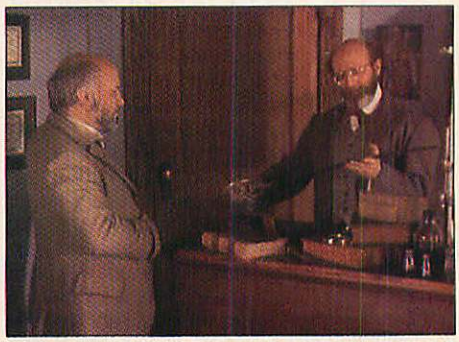
The Case of the Mystified Murderess.

Two sisters. One beautiful. The other quiet and plain. A single man. Tall, handsome... and dead. Who did it? Was it jealousy or was it greed? Could the murder be tied to a rash of burglaries causing panic in the upper-class communities of London?

The Case of the Mummy's Curse.

Four men found dead. Some say the murderer is a 4000 year old Mummy exhumed during an archeological dig in Katebet, Egypt. Were their murders simply coincidental or were these men cursed from the crypt? Great sets and effects. You — and Holmes — try to unravel one of the century's most bizarre murders.

The Case of the Tin Soldier.



Waterloo, 1815. Power and Passion. He was an officer but not a gentleman. Now, years later, the retired General has been murdered, a jewel stolen, and a king's ransom waits to be claimed. Who killed General Armstead and why? Holmes enters the scene. This case is a baffler, there are no solid clues.

ICOM

BAS2703 **Sherlock Holmes, Consulting Detective CD-ROM** **$59.95**
Sherlock Holmes: *requires CD-ROM reader and will run on a MAC LC or greater*

Pay The Absolute MINIMUM Postage Possible!

The Only Fully Integrated Postage-Reduction Software Certified By The U.S. Post Office.

REVIEWER'S NOTEBOOK: *Nothing else in its class... SuperBulkMailer+ is the only fully integrated bulk mailing system for the Mac. Dramatically increase your response with cleaner, accurate and more efficient mailings!*

SuperBulkMailer+ contains unbelievable power, and is remarkably simple to use to its full potential. It is CASS (Coding Accuracy Support System) certified by the United States Post Office. Achieve the lowest possible rate for your bulk mailings — up to 50%. Quick, easy importing of any mail list in any program or platform, with any delimited or non-delimited fields in ASCII format. SuperBulkMailer+ automatically corrects, parses, standardizes, adds Carrier Route, ZIP+4 and bar codes to your list. The most complete set of features we've ever seen for economical 1st, 2nd and 3rd Class sorting. Save thousands of dollars on your mailings right off the top, then fine tune for lowest rate. Eliminates undeliverable and duplicate records by exact name, phonetic name or phonetic coding. Allows you to instantly build your own searches, create custom reports, mail-merge letters with ease and choose from a variety of built-in formats and templates. Even includes built-in Avery templates.

Professional-level mailing features...Fast, "On-The-Fly" operation, precise ZIP+4 demographic capabilities, fully integrated word processor and more. Don't mail without SuperBulkMailer+...

The Ultimate Postage Reducing System. SuperBulkMailer+ 1.0 is the only Fully Integrated Certified Bulk Mailing software available for the Macintosh® today. SuperBulkMailer+ is CASS (Coding Accuracy Support System) certified by the U.S. Postal Service. By adding Zip+4, Carrier Route and Bar Coding to each deliverable address, our Software System assures that any business doing a mailing will obtain the lowest postal rates available. SuperBulkMailer+ also includes a built-in fully integrated Word Processor, Custom Label Generator, Custom Report Generator and all Avery® Label Templates. These features are all built into SuperBulkMailer+ 1.0, allowing you to access any of the many fields directly from your database with just a click of your mouse. SuperBulkMailer+ also has the ability to print all postal forms and stack tags for bulk mailings.



SuperBulkMailer+ allows the importing or exporting of any database from any platform with any delimiters. SuperBulkMailer+ allows you to select the field order for importing any file. All of your import and export criteria cam be saved and loaded back in when the export/import is processed again. Our system also allows for fixed length exports or imports. A powerful filtering system has been added to SuperBulkMailer+ 1.0 that will give the end-user the tool to filter out any delimiter in an ASCII file and replace it with another delimiter that they can use to import records into their own database.

SuperBulkMailer+ also performs 'On The Fly' parsing, standardization, Zip+4 coding, Carrier Route coding, and Bar Coding. As an address is entered into the field it is automatically corrected, parsed and standardized. Then enter in your Zip Code and the City and State fields are automatically generated. Or enter a valid Address and City/State, SuperBulkMailer+ produces the proper Zip Code, Zip+4, Carrier Route and Bar Code. This allows you to create a mailing list out of source books that do not give you Zip Codes, but do give you Zip Code information.

SuperBulkMailer+ has built in quick searches, custom searches, custom sorts, Nth sampling and other powerful tools used for selecting addresses to be mailed or printed. Searches and Sorts can be performed on any field in our database. The custom Search and Sort Criteria can be saved to disk, then loaded back in when needed again.

Build your own reports, labels, searches, sorts, imports and exports and save them to disk, or use one of our many pre-set Avery® label templates or built in reports. Logos and bar codes can be placed and printed on your labels, reports or word processing templates.

Zip+4 data used with SuperBulkMailer+ comes in two forms. Companies with local mailings can order the Zip+4 on diskettes. For statewide or nationwide mailings Zip+4 data is available on CD-ROM. Current Zip+4 and CRRT information is sent out on CD-ROM quarterly to keep mailing lists current.

SUPERBULKMAILER + 1.0
BAS2704 **SuperBulkMailer+** **$680.00**

The Integrated Package That's Truly Integrated.

Work With All 7 Programs At Once! It's Seamless... It's BeagleWorks!

REVIEWER'S NOTEBOOK: *Beagle Bros. Software has consistently offered up some of the finest products we've seen for the Apple Computer. Each is clean, powerful and easy to use. Now, Beagle Bros. assembled a product that offers an integrated software program with seven modules. Beagle Bros. went back to the drawing board to create a new concept of integration, allowing users instant access to all information in the modules. Their efforts have produced In-Context Editing™, which links the word processor (with speller/thesaurus), spreadsheet, database, charting, drawing program, paint program and communications. This high level integration makes life very easy. Link documents and combine data from any of the individual modules into a single document and make changes without ever leaving that document.* ***Feature for feature, BeagleWorks beats ClarisWorks, GreatWorks and Microsoft Works in every area we tested.*** *It's the only one of the four that is System 7 SAVVY, so it takes full advantage of Publish & Subscribe, Balloon Help, TrueType, AppleEvents, Virtual Memory, 32-bit file addressing and color icons. An incredible value, ready-to-run for users of any expertise level. Great starter application that won't be quickly "outgrown."*

A new definition of integration. For example, you can actually combine information from any of the seven modules into a single document. Or create new information in another module without leaving the module in which you are currently working. And with the innovative In-Context Editing, when information is changed in one document, the information in the linked documents changes with it. Automatically.



Publish & Subscribe information from any of the modules. BeagleWorks includes some powerful desktop publishing features like wrapping text around objects, setting multiple columns on and off anywhere on the page, and reduction and magnification as well as page preview in any module.

You'll love the full-featured Spreadsheet that allows you to create up to 256 columns and 16,385 rows. A powerful tool bar and time-saving recalc automatic summation features. The charting modules creates robust, 256-color line, bar, column, area, scatter and exploded pie charts. The database module allows 16,000 records per file, 256 fields per record and easy mail-merge. Sixty-four built-in functions are all at your command and BeagleWorks provides 32 report formats for your data.

Wanna' draw? Just pop open BeagleWorks' draw module and choose from a palette of tools, colors, patterns and line widths and shapes. The streamlined, tear-off menus make it a pleasure to work with. While you're in a creative state, zip into the paint module and get crazy with a host of spectacular studio tools — and some nifty special effects as well. Airbrush, spray can, paint bucket, pencil, line and more. Provides 256 custom colors and 128 patterns.

When you're ready to connect your Mac to the world, BeagleWorks' communications module makes use of Apple's Communications toolbox to give you powerful connectibility! It stores commonly used phone numbers with a variety of convenient settings. Autodial, autoanswer, uses a modem or direct serial connection.

Word Processor: Automatically wrap text around objects; format in multiple columns; graphic ruler with tool bar for quick formatting; multiple headers and footers, custom styles and more; Microlytics® spelling checker and thesaurus.

Spreadsheet: Apply a different type style to any cell; create up to 256 columns and 16,384 rows; tool bar allows easy access to formatting.

Chart: Chart types include Line, Bar, Column, Area, Scatter, Exploded Pie and more; 256 custom colors.

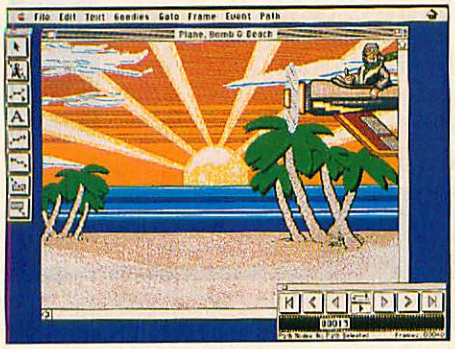
Database: Manage databases with more than 16,000 records per file and 256 fields per record; mail merge with word processor; 64 built-in functions; up to 32 report formats of your data; tool bar provides easy access to formatting and alignment.



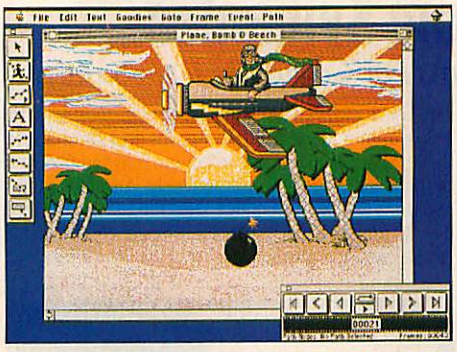
Draw: Tear-off menus for tools, colors and patterns.

BEAGLEWORKS
BAS2700 **BeagleWorks** **$184.00**
BAS2701 **Competitive Upgrade** **$95.00**

Create captivating presentations and movies just like the pros — in 3 easy steps.



First create a background in Animation Works or your favorite paint program. Next create the "actors" the same, easy way.



Finally, put it all together with point and click ease. Use hundreds of special effects and sound for state-of-the-art shows!



The Desktop Movie Studio!...

Create Fully Animated Scenes In Just A Few Minutes...

REVIEWER'S NOTEBOOK: *This remarkable product allows you to animate — by just drawing lines; in effect, telling the system where to move the objects and how fast. That's it. Quickly defining what the objects, "actors" and backgrounds will look like. Animation Works allows you to create colorful movies for sales presentations, demonstrations, storyboards, video titling and production. It's easy enough for inexperienced users, yet has all the power and features for graphic designers, creative directors and video producers. They love how easy it is too. Great training and educational tool. To create a sequence illustrating how a piston works or how a bird achieves flight would take about twenty minutes. Just draw lines to show Animation Works the path...*

Animation is high-impact communication. The ability to deliver messages to an audience, student or prospect with animated sequences along with sound and text is dynamic. Animation Works makes it simple; that's why it's become one of the most popular Mac multi-media products in the business. The concept of "path-based" animation makes moving an object as easy as drawing a line across the screen. Establish different paths for each object in your scene, or attach the motion of one object to that of another, for complex sequences. Animate text to create titles, scrolling credits and feature lists. Quickly add customizable wipes, fades and other intriguing transitions between scenes. Animated mattes allow you to enclose action within a shape for incredible video-like effects. Adding backgrounds, sound, special effects, color and mattes are a mouse click...

The Color Cycling capabilities allow your imagination to explode with animated color effects, giving you four independent color cyle ranges.



The sequence of three frames you see on this page have been taken from 25 frames that make up the entire animated sequence. Here's how we did it: We first assembled our background (we created the scene in Animation Works, but we could have done it in a paint program), using a variety of shapes, patterns colors and textures. The Film Player you see in the lower right-hand corner of the screen tells us which frame in our movie that we're currently editing.

ANIMATION WORKS

BAS2702 **Animation Works** $120.00

Draw, Paint, Retouch. Make Digital Movies!

REVIEWER'S NOTEBOOK: *In addition to the two industry standards reviewed on this page: Adobe Illustrator and Adobe Photoshop, TigerSoftware is proud to be among the first to offer Adobe Premiere, an incredible new title that allows you to combine video footage, audio, animation, still images and graphics to produce digital movies on your Mac. Uses Apple's QuickTime media-integration technology, so multi-unit production hardware isn't required. Adobe Premiere is fast, fun and yields high-quality results. Interactive presentations, television ad concepts and roughs, video databases, merchandising sequences and training sessions are just a few of the wide-ranging uses for this hot new title.*

ADOBE ILLUSTRATOR: A slew of impressive industry awards grace the Illustrator box, a clue to the amazing capabilities you'll discover inside. Indeed, Adobe Illustrator is the most powerful drawing, page design and production tool in the world today, ideal for designers with a desire to elevate their work to a new vista of speed and creativity. It's the only system capable of precise illustrations, extensive text handling, fully automatic graphing and color separations. You can work from existing images if you like — just scan it and you're ready to begin. Or draw from scratch using Illustrator's magnificent set of drawing tools, the envy of the industry. It's as simple as moving the mouse.

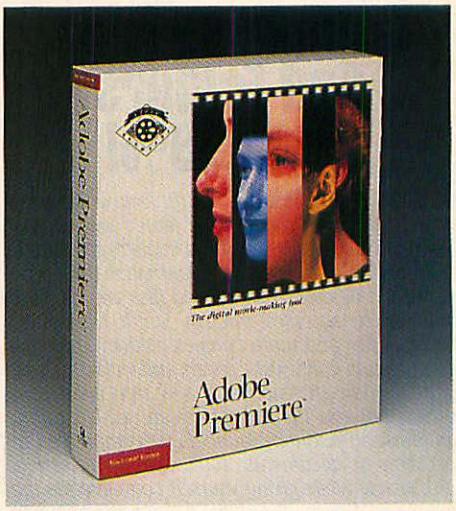
(This package includes free Adobe Type Manager and 13 type faces).

ADOBE PHOTOSHOP: The ultimate color-retouching/image processing system for the Mac. A great pre-press and production tool, Adobe Photoshop has garnered loyal users in all areas of graphic design and color reproduction. Using its extensive features, it's able to create anything you can imagine. Full 32-bit color artwork with full control and flexibility to manipulate and combine photographic images, and the ability to create stunning video effects. Color separations are precise, meeting or exceeding even the strictest standards for reproduction. You can produce bitmapped, grayscale or continuous-tone color, add color, change it or remove it completely. Produce intriguing duotones, tritones and quadtones. And you can use your existing Adobe Illustrator files in your Photoshop images. You've got a great selection of creative tools right at your fingertips.

ALL NEW! ADOBE PREMIERE... Become a movie maker — with the help of your Mac — and new Adobe Premiere. It's the newest creative tool from the leaders in precision graphics and photo manipulation. It's fast, easy and fun to use — just gather your clips and arrange them in the order you want them to play and Premiere handles the rest with blazing speed.

Premiere utilizes the Apple QuickTime extensions to store and import your video and audio files. You can arrange your clips to appear in progression with simple cuts, or overlap them to create dramatic transitions like dissolves, page turns and spins. You can isolate areas of your moving video or still images and superimpose them onto other clips to create a wide range of special effects that will grab your audience like nothing else they've ever seen.

You can use plug-in filters (including Adobe Photoshop-compatible filters) to produce tints, distortions and replications. Using Apple's QuickTime extensions, you get the enormous capabilities of true



media integration — and now, you can produce digital movies at an affordable price, for a variety of uses. And with QuickTime, you can store video footage and accompanying audio on an ordinary disk drive. Copy clips over and over without distortion or loss of quality.

ADOBE

BAS2501 **Adobe Photoshop** $549.00
BAS2502 **Adobe Illustrator** $359.00
BAS2503 **Adobe Premiere** $308.00

Adobe Illustrator: *Macintosh II, LC or SE product line, Plus or Classic with a hard disk; at least 2 MB of RAM using System 6.0.5 or greater or 4 MB of RAM using System 7.* ***Adobe Photoshop:*** *Macintosh II product line or SE product line with at least 2 MB of RAM; System 6.0.4 or later and a hard disk.* ***Adobe Premiere:*** *Macintosh II family computer; 4 MB RAM; high-capacity hard drive (80 MB or more recommended); System 6.0.7 or greater; QuickTime v1.0 or greater; 32-bit QuickDraw v1.2 or greater.* ***Shipping charges billed actual cost.***

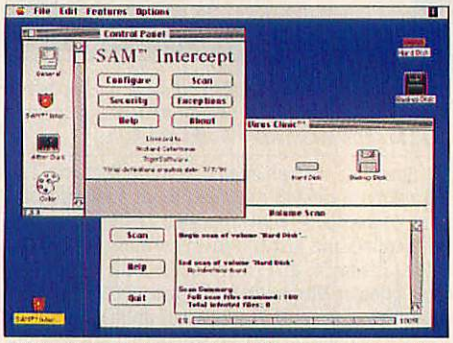
Top-Quality Virus Protection And File Recovery From Symantec...

Two Powerful Protection Systems For Complete Data Safety.

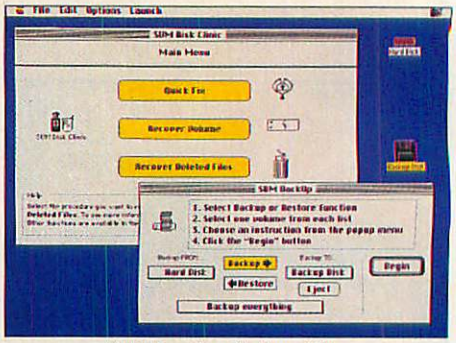
REVIEWER'S NOTEBOOK: *SAM: Let's talk viruses. They're becoming a serious problem. Industry watchers have estimated that corporations have lost hundreds of millions of dollars in time and equipment — attributable directly to computer viruses. With Symantec Antivirus for Macintosh (SAM), you can forget about vulnerability to viruses forever. SAM's state-of-the-art technology detects intruders and launches a counterstrike: the frontline protection actually intercepts invaders whenever an application is launched. If a virus is detected, SAM removes it and immediately goes about repairing the damaged areas of the disk. You'll even get information and preventative measures against new strains with access to Symantec's Virus Newsline. SAM supports standard network environments (TOPS and AppleShare) and is compatible with MultiFinder.*



Don't get blasted with the effects of one of today's killer viruses. Install the most unforgiving virus protection product in the business. SAM delivers solid protection with its innovative SAM Intercept — actually prevents viruses from entering your system, performing extensive checks when applications are launched and instantly detects attempts to bypass the system — usually a viral attack. Automatically scans loppy and removable disks when you insert them. The SAM Virus Clinic scans all of your files, folders, volumes and file servers for viruses and for changes in files that could indicate infection. Infected files can be repaired or deleted immediately. Another useful feature is the Auto-Disinfect Desktop, which swiftly detects and removes viruses automatically from any of your desktop files.



SAM's always in the background, watching for suspicious activity.



Fast disk repair and backup utilities.

REVIEWER'S NOTEBOOK: *SUM II: With the threat of virus attack off of your list of things to worry about, let's turn to the subject of file recovery, backup and security — and the amazing new SUM II. It's the most powerful, flexible combination of Crashed disk and file recovery, backup, optimizer and security in one package. It contains utilities for to quickly handle any problem. In fact, we recovered crashed disks and some deleted files with SUM II Recover — and we didn't even have SUM II installed! Instantly diagnoses any problem and repairs it immediately. Includes new SUM Backup, SUM TuneUp, SUM Shield and SUM QuickCopy. All excellent examples of top-notch software programming: fast and easy, with powerful functionality built-in. All the utilities are here. Above and beyond any competitive package we've seen.*

Keeping your data safe, secure and efficiently organized. That's the mission-statement of SUM II. A widely-acclaimed collection of world-class utilities for the Mac.

There's also a new SUM QuickFix that is designed especially to repair damaged hard disks using advanced new techniques and new SUM Encrypt allows encryption security — including DES.

SYMANTEC

BAS2705 **SUM** $96.00
BAS2706 **SAM** $66.00

Compress Files And Folders Up To 98%!

REVIEWER'S NOTEBOOK: *StuffIt Deluxe 2.0 is the latest utility from the mind of famed programmer Raymond Lau, and is already an industry standard in compression and archiving. Many national (CompuServe and GEnie) bulletin board files are "Stuffed" and can be accessed through StuffIt Deluxe. It's faster, easier and more competent than any other compression utility we've tested, and includes a slew of state-of-the-art features: a new intelligent compression option, the ability to create self-UnStuffing archives and automatic launching of compressed application or documents. You'll save some serious disk space, while giving yourself complete file manipulation control, the ability to open multiple windows, move, copy, sort, rename and delete archived files — even add password security! By compressing files, you also save modem transfer time. Put the Magic Menu Extension in your System Folder and watch a new menu appear in the Finder. Now Stuff and UnStuff files and folders from within the Finder. There's even built-in virus protection.*

If you're not using a compression utility, you're leaving valuable disk space on the table. And if you're not using StuffIt Deluxe, you may be missing out on a wide range of helpful tools.

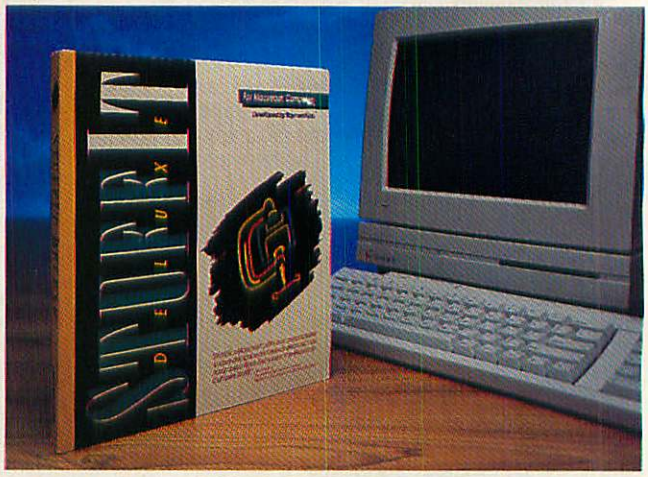
StuffIt Deluxe features a new QuickStuff command that brings up a dialog box — you simply choose the file or folder you want to stuff. StuffIt Deluxe then instantly creates an archive and stuffs your files. QuickUnStuff is just as easy — just select the files and it's done! There's also a Control Panel file — Magic Menu — that places a menu called Magic in the Finder. Just select the files or folders you want stuffed — right from your desktop, and without opening StuffIt Deluxe! Incidentally, Microsoft Mail and QuickMail users can stuff and send their E-mail files without actually using the E-mail software.

If you're like most users, you'll adopt StuffIt Deluxe as your main backup program. The extensive, Finder-like operation allows you to actually open multiple archives and move files between them. And only StuffIt Deluxe provides an easy-to-use scripting language to automate your archival procedure.

Also From Raymond Lau... New SHORTCUT. How would you like to put all of the files and folders that you use all the time onto one menu? Now you can — quickly and simply with new SHORTCUT, the ingenious disk management and file/folder navigation utility that appears within every application.

Using SHORTCUT means that you'll never have to conduct all-out searches for files or folders again — just a mouse click finds whatever you need. By placing a pop-up menu in each application's directory dialog box (a.k.a. Open and Save dialogs), SHORTCUT instantly gives you the ability to "Fast Find" lost files and jump between files and folders. And if you're a StuffIt Deluxe user, SHORTCUT gives you transparent access to StuffIt Deluxe archives. These compressed archives appear as regular folders on your disk. Just double click on a file in an archive and it's instantly decompressed and ready to go!

SHORTCUT is straight forward, simple and powerful. You can create new folders without using the Finder, rename, delete and lock files and folders, quickly see vital information on files, view text and PICT documents from within any application (even if the application doesn't support them!), and more. The powerful Find command allows you to perform searches with blistering speed by just typing any part of the document name or folder name. You can even customize SHORTCUT to your own needs in just seconds from the Control Panel.



STUFFIT and SHORTCUT

BAS2420 **StuffIt Deluxe 2.0** $62.00
BAS2421 **SHORTCUT** $45.00
Any Macintosh computer with a hard drive running System 6.0.2 or later with at least 1MB RAM.

CALL 1-800-666-2562
TIGER ORDER HOTLINE

TIGERSOFTWARE

GUARANTEED LOWEST PRICES
ON ANY MACINTOSH PRODUCT

Upgrade to 1-2-3 – Just $99!

REVIEWER'S NOTEBOOK: *The thoroughbred of Macintosh spreadsheets. Not a step-child of the original DOS product, Lotus 1-2-3 for the Mac has been designed from the ground up to exploit the power and flexibility of the Mac. Revolutionizing financial software with true 3-D worksheet capabilities: Excel doesn't have it, Claris Resolve doesn't have it. Fully featured, with System 7 support; completely customizable with desktop tear-off menus, most functions require just a mouse click. Excel users will be surprised at the power and grace engineered into Lotus 1-2-3 for the Mac.*

Lotus' deep understanding of advanced spreadsheet and financial modeling technology is present here. True 3-D worksheet management, incredibly nimble relational database power and easy-to-use formulas. Over 14 million people rely on the Lotus concept to create budgets, perform precise forecasting and instant analysis. Proposals and presentations ring with clarity with Lotus' financial graphs and tables. It's easy to edit cells, create graphs, and import data, using the same menus, tools and file formats across worksheets, graphs and macros.

Using 1-2-3 for the Mac is fast and simple. It embraces new System 7 and provides the classic 1-2-3 menu for complete keystroke compatibility. We love the use of floating toolboxes and palettes, allowing customization of your workspace. Moving around is silky and streamlined, allowing you to quickly select ranges (before or after starting commands). You get in-cell editing and the ability to directly manipulate chart elements. You also get 256 colors, 49 different fill patterns and 230 line styles and thicknesses for use in your spreadsheets.



Along with the brutal power of 3-D worksheets, you can easily customize database forms for automatics fill-in and printing, perform a host of advanced relational capabilities, including swift queries (a particularly useful feature), an ever-active macro recorder (an incredible time saver!), and automatic compression routines for any printer. By the way, Lotus throws in a free copy of Adobe Type Manager.

With 1-2-3 for the Mac, complicated tasks, like consolidations, don't require tedious linking or endless dialog box activity, just a couple of mouse clicks is all it takes. Easily bring remote data right into 1-2-3 through DataLens and the Apple Data Access Language. Read FoxBase and dBASE files directly.

Lotus 1-2-3 for the Mac towers over the capabilities of Excel in a host of areas. Its ability to perform true 3-D functions is an enormous advantage. And the spectacular range of colors and graphic devices available within the worksheet. Excel doesn't allow pop-up functions or range names, Excel doesn't allow you to directly manipulate elements in charts, or perform in-cell editing Lotus 1-2-3 for the Mac does. Excel doesn't include relational capabilities, floating toolboxes or palettes, you can't customize your workspace or have your macro recorder on all the time. 1-2-3 does.

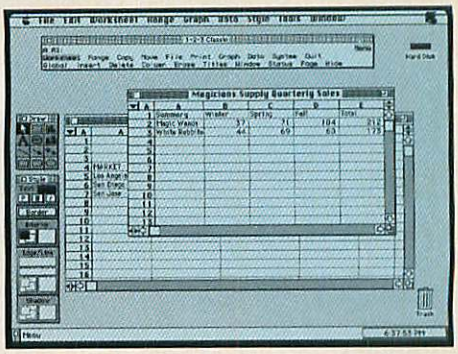
When it comes to spreadsheet features, no one even comes close to 1-2-3 for the Mac. That's because only Lotus has engineered true 3-D worksheet power into 1-2-3. Excel users are converting in droves to the newest, hottest spreadsheet product, finding features like relational joins and queries, the 1-2-3 Classic menu for 100% keystroke compatibility, vast color and graphics support and a dozen other advantages. In fact, we've compiled a feature-by-feature comparison for your review. But there's an intangible difference: The proven 1-2-3 approach to the worksheet. Just the feel of the in-cell editor, pop-up functions and macros display the refined Lotus functionality. John Sculley, CEO of Apple says "...This is a spectacular product." And MacWeek raves: "The most impressive aspect of the program is its implementation of the Macintosh interface. Mac aficionados will have no problems with the program — 1-2-3 Mac is a Mac application to the core." The numbers have never looked so good...

More Powerful Than A Locomotive. True 3-D worksheet management lets you tackle complex tasks, without complicated linking or dialog boxes. Bring remote data right into Lotus 1-2-3 through DataLens® and the Apple Data Access Language. Then work with it using full relational database power and custom database forms. No matter what you're doing, you'll see only one set of menus, tools and file formats. You'll get so much done with so little to learn.

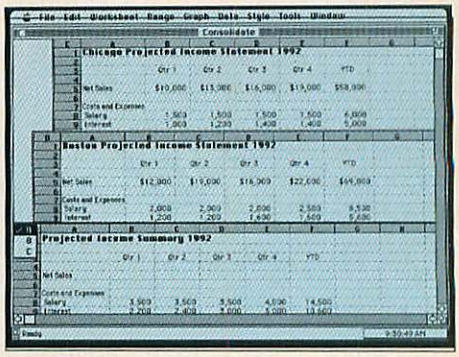
No Mac Is An Island. Share files, macros and applications with Excel users? With PC users? Yes. You heard right. 1-2-3 for Macintosh directly reads and writes Microsoft® Excel for Macintosh files. So you can make the switch to 1-2-3 and never look back. What's more, 1-2-3 for Macintosh is fully compatible with all 1-2-3 files and macros, including PC versions. More than fourteen million people already rely on Lotus 1-2-3 for accounting, budgeting, forecasting, analysis, proposals, presentations and much more. Now Mac lovers can, too.

See How The Newest Macintosh Spreadsheet Stacks Up.

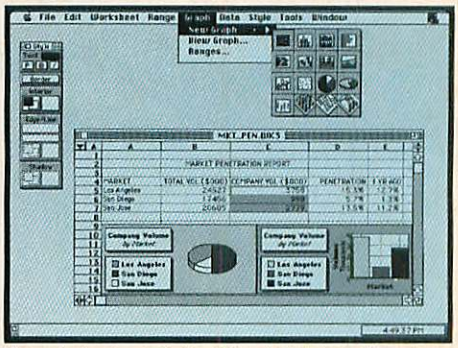
Features	Lotus 1-2-3 for Macintosh	Microsoft Excel 3.0
Optimized for Macintosh		
• Supports system 7 features	Yes	Yes
• Floating toolboxes and palettes for custom workspace	Yes	No
• Directly manipulate chart elements	Yes	No
• In-cell editing	Yes	No
• Context-sensitive, graphical help	Yes	No
• Select ranges before or after starting commands	Yes	No
• Supported colors/fill patterns/ line styles and thicknesses	256/49/230	16/18/32
Powerful Spreadsheet Features		
• True 3-D worksheets	Yes	No
• Pop-up functions and range names	Yes	No
• Menu promotion	Yes	No
• Same menus, tools, and file formats across worksheets, graphs, and macros	Yes	No
• Adobe Type Manager included	Yes	No
• Automatic compression on all printers	Yes	No
• Macro recorder always active	Yes	No
• Customizable database forms	Yes	No
• Relational joins and queries	Yes	No
• Directly reads FoxBase and dBASE files (.DBF)	Yes	No
Compatibility		
• **Reads and writes all 1-2-3 files**	Yes	Yes
• Runs all 1-2-3 macros without translation	Yes	No
• Reads and writes Excel files	Yes	Yes
• 1-2-3 Classic Menu provides keystroke compatibility	Yes	No



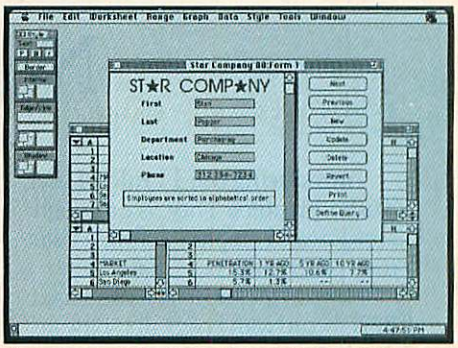
"Classic" 1-2-3 menus work the same as the 1-2-3 everyone knows and loves. (Or use the standard Mac menus — your choice.)



Only 1-2-3 has true 3D-Worksheets. Perfect for linking Profit Centers and multiple departments.



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Circle 313 on reader service card

MACWORLD News

THIS MONTH:
16-Inch Color from Apple
OLE for the Mac
Diskless Macs
Frame Relay

BY DAN LITTMAN AND TOM MORAN



MICHAEL BARLEY

SCULPTOR BRUCE HAMILTON IN HIS NEW MEXICO STUDIO, SURROUNDED BY WORKS OF WOOD AND PLASTIC DESIGNED ON A MAC.

Two Worlds of Sculpture

In a studio near Santa Fe, New Mexico, complex structures are taking shape at the hands of sculptor–RenderMan hacker Bruce Hamilton. Hamilton builds sculptures of laminated wood and other media, in a style that he describes as "like Russian constructivist."

Hamilton designs works on the Mac with a 3-D modeler and a RenderMan front end called Mickey. Hamilton says he likes Mickey because it does constructive solid geometry and because he can design by keying in object descriptions instead of using modeling tools.

Mickey is unpublished. Arq Software, 619/454-3803. —D.L.

Dayna's Low-Cost Ethernet Hub

Dayna Communications has unveiled the DaynaStar MiniHub, a 10BaseT Ethernet hub that provides eight RJ-45 ports for $449. The MiniHub can work as a stand-alone eight-port network, or it can be daisy-chained to create larger networks, or it can link to a thin Ethernet backbone via a separate BNC connector.

The DaynaStar MiniHub is currently shipping. Dayna, 801/531-0600.—T.M.

600-dpi Laser Printers from—Gulp!—IBM

Okay, these printers aren't quite from IBM, they're from Lexmark International, which bought IBM's printer business and now makes printers under the IBM label. The point is, the 4029 series of IBM LaserPrinters can work with Macs through an optional $349 AppleTalk interface, and you can add PostScript via Lexmark's $499 Adobe PostScript Option and an additional 1MB of RAM.



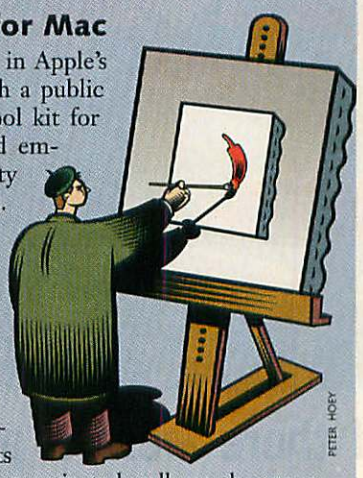
JOHN WILLIAM LUND

THE IBM LASERPRINTER 10, ONE OF A SERIES FROM LEXMARK, PRINTS 10 PAGES PER MINUTE.

The four printers are the $1595 IBM LaserPrinter 5E Model 10, a five-pages-per-minute model; the $1895 IBM LaserPrinter 6 Model 20, a six-ppm printer; the $2395 IBM LaserPrinter 10 Model 30, a ten-ppm device; and the IBM LaserPrinter 10L Model 40, a ten-ppm printer with improved networking capability. All of these printers include 16 Adobe Type 1 outline fonts and 10 bitmap fonts. All except the LaserPrinter 5E Model 10 can produce 600 by 600 dpi with the PostScript option. The four printers are available now.—T.M.

TREND

Microsoft's OLE for Mac



PETER HOEY

Microsoft is poking a toe in Apple's system software door with a public spec and a developers' tool kit for adding object-linking and embedding (OLE) capability to Macintosh applications. OLE is Microsoft Windows' standard way for allowing applications to share data.

OLE is similar to System 7's publish and subscribe, but an OLE object—one document embedded in another—exists in only one place and, when activated, calls up the appropriate application. OLE for the Mac is actually an AppleEvents suite, using IAC, the same underlying technology that makes publish and subscribe possible. Microsoft says that if file format problems can be solved, it will be possible to link objects across platforms—for example, to embed and later edit an illustration created on the Mac in a Windows page-layout document.—D.L.



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Circle 157 on reader service card

News

DesignJet Prints up to 36 Inches Wide

The new large-format DesignJet thermal ink-jet printer from Hewlett-Packard can produce output that is up to 36 inches wide using a Macintosh—thanks to a Chooser-level driver from Palomar Software. The driver, called Plottergeist ESP, translates QuickDraw into the printer's native HPGL/2 control language.

The Hewlett-Packard DesignJet lists for $10,995, and the Plottergeist ESP software goes for $995. The DesignJet was expected to be available by the end of 1991. Plottergeist ESP was scheduled to be available in November 1991. Palomar, 619/721-0900.—T.M.

Apple's 16-inch Color Display

Apple has introduced a 16-inch color monitor to fill a gap between its existing 21-inch and 13-inch color displays. With 70 percent more screen area than a 13-inch color monitor, the Macintosh 16" Color Display is well suited for working with multiple windows and other screen elements that can easily become buried in the smaller display, but is not intended for viewing and designing two full-size pages at once.



JOHN WILLIAM LUND

THE MACINTOSH 16" COLOR DISPLAY, APPLE'S FIRST 16-INCH COLOR MONITOR, HAS A SUGGESTED LIST PRICE OF $1599.

The Macintosh 16" Color Display, which costs $1599, has a resolution of 832 by 624 pixels at 70 dots per inch, with a 75Hz refresh rate. When it is attached to a Quadra 700 or 900, the monitor requires no video board to provide 8-bit color at 832 by 624 resolution. With a video RAM (VRAM) upgrade, the Quadras provide 24-bit color for the monitor at the same resolution.

On Mac II's the monitor requires a graphics board such as the Macintosh Graphics Card 8•24 or 8•24GC. Apple has recently upgraded both boards to support System 7 and the 16-inch monitor's resolution at 8 bits, and both boards are upgradable to 16 bits. Companies such as E-Machines offer boards that permit Mac II's to show 24 bits on the monitor. The original 8•24GC board was designed to accelerate QuickDraw graphics; the new version also speeds up QuickTime operations, and its list price has been cut to $1499 (from $1999). The 8•24 board remains priced at $699.

Because the Macintosh 16" Color Display monitor has a built-in tilt-and-swivel base with two ADB ports, a microphone port, and a headphones port, users can operate their computers while the system box is stored under a desk. The monitor meets the Swedish MPR 2 guidelines for limiting ELF and VLF emissions. The monitor and both boards were scheduled to begin shipping on January 13. Contact your Apple dealer.
—ADRIAN MELLO

Pacific Parallel Designs Ultrapowerful Mac

Pacific Parallel has turned a Macintosh into the processing equivalent of a supercomputer by adding modular transputer processor boards designed to work in parallel. The SuperServer-C can be upgraded from a single transputer processor to a 32-transputer processor and an estimated performance of 800 MIPS and 100 MFLOPS—way beyond the ken of mortal Macs, but less than the company's existing 64-processor model. The 32-processor version requires Second Wave's Expansion II Chassis, which adds 8 NuBus slots to the system.

The processor modules are compatible with System 7, according to Pacific Parallel. Multiple users can access the system simultaneously across a network. The SuperServer-C modules cost from $1400 for 1 processor to around $38,000 for 32 processors and 128MB of RAM. The units ship about 4 weeks after the receipt of an order. Pacific Parallel, 619/481-8427.—T.M.

Wall-to-Wall Music

Keith Yates AudioVideo designs and installs elaborate stereo systems, small concert halls, and small movie theaters for multimillion dollar homes. To win a bid on a home that is still in the planning stages, Yates's firm often takes the architect's drawings and uses Dynaware's DynaPerspective to render a three-dimensional model of the home, complete with stereo system, concert hall, or whatever the project is.

The firm generates a walk-through in DynaPerspective and then moves into MacroMind Director to create a presentation, using DigiDesign's AudioMedia to add narration, CD-quality music emanating from hidden speakers in the home, or the sound track of the film being screened in the theater. Keith Yates AudioVideo, 916/663-1738.—D.L.



DAN MILLS

KEITH YATES (LEFT) AND ALLAN HALEY IN THE CONCERT HALL WITH MOVABLE WALLS THAT YATES DESIGNED FOR HALEY'S HOME.

JUST FOR FUN

Star Trek: The Sound Generation

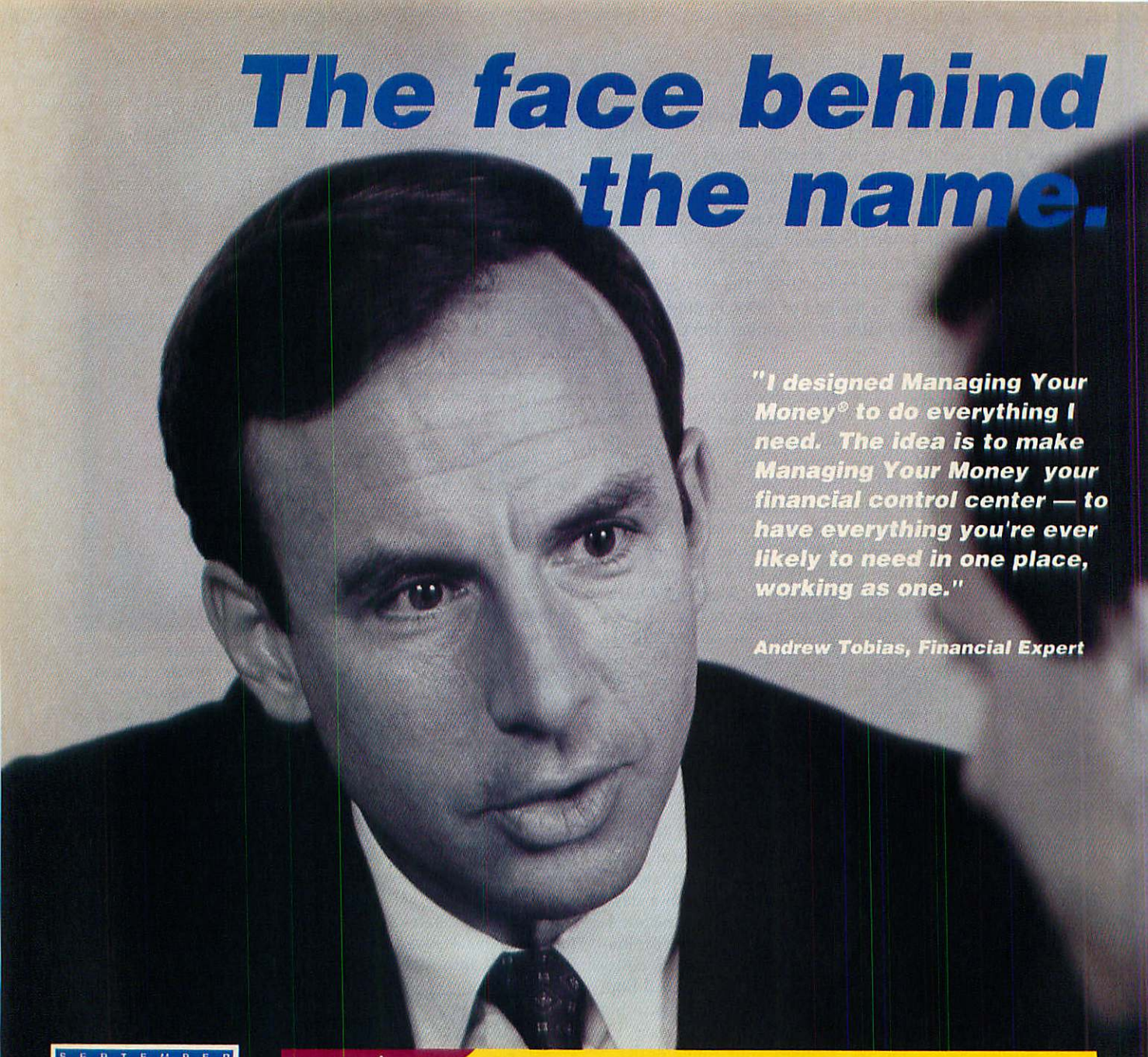
I find it entirely illogical, Captain, that humorous sound effects and famous quotes from an ancient "science-fiction" series should have a salubrious effect on the general morale of the crew; however, in this case the facts seem indisputable. Audio selections such as "Maximum warp!," "Red alert!," and the classic, "He's dead, Jim," seem somehow to improve the level of efficiency among you emotional Earth people.



ANDREW FAULKNER

Computer analysis indicates that these sounds may be installed on a device called a Macintosh, and linked to computational events such as start-up, disk insertion, beep, and so forth. The availability of two sets of sounds—Volume One, The Logical Collection, and Volume Two, The Final Frontier—increases the probability of psychological addiction to this form of diversion. In fact, Captain, considering the list price of $49.95 each, including the SoundMaster application, I calculate that addiction is a near certainty. Long-range scanners indicate that the phenomenon originates in a system called The Sound Source. Lieutenant Uhura, open channel 818/879-0093.—T.M.

The face behind the name.



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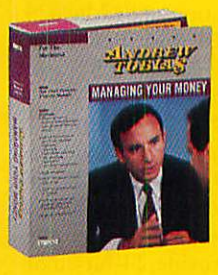
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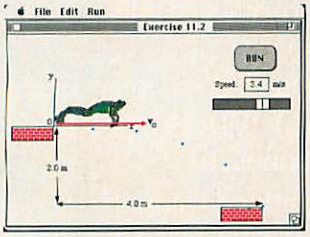
News

Simulating Physics

Interactive Physics is an educational tool for modeling the interactions of physical objects—for example, you can set mass and velocity for several objects, aim them at each other, and watch an animation of them crashing together.

The new version adds many new tools such as pulleys, pins, and joints; hydraulics and air pressure; and motors. It also has a run-time engine so that a teacher can design a simulation and lock its structure, but leave parameter boxes for students to change settings such as mass or velocity.

Interactive Physics II will list for about $250. Its developers are also working on a high-end physics simulation package for engineers. Knowledge Revolution, 415/553-8153.—D.L.



AN INTERACTIVE PHYSICS II SIMULATION. NOTICE THE SPEED SLIDER? THE NEW VERSION LETS TEACHERS CREATE MINIPROGRAMS.



SCOTT PETERSON

THE NEC SILENTWRITER MODEL 95 PRINTS 6 PAGES PER MINUTE AND HAS AN ADOBE POSTSCRIPT LEVEL II CONTROLLER.

NEC Printer Recognizes PostScript, PCL

NEC Technologies has introduced the Silentwriter Model 95, a 6-pages-per-minute laser printer that incorporates an Adobe PostScript Level II controller. The printer can tell whether a file coming in from the network is PostScript or PCL (for DOS PCs), and it continually monitors its AppleTalk port, parallel port, and two serial ports to detect incoming files. The printer also includes 35 resident Adobe Type 1 fonts; 2MB of RAM; and Sharp Edge Technology, which provides print quality equivalent to 600 dpi, according to NEC.

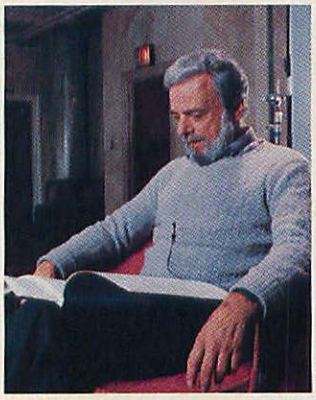
The Silentwriter Model 95 was slated to begin shipping in late January at a suggested list price of $2249. NEC, 508/264-8000.—T.M.

Look, Ma, No Drives

Sonic Systems has devised a combination ROM upgrade and software that lets Macintoshes boot up over a network without the need for either hard drives or floppy disk drives. Intended to reduce overall system costs and for high-security installations, The Diskless Mac works in conjunction with Ethernet boards from Sonic Systems, Apple, Asante Technologies, or 3Com.

The network server can be set up as a *standard system image*, or operating environment, so all the Macs on the network have the same software installed at start-up. The software allows for multiple standard system images for different classes of users.

The Diskless Mac lists for $149 per node and is currently shipping. Sonic Systems, 408/736-1900.—T.M.



LINDA RICH

STEPHEN SONDHEIM STUDIES A SCRIPT DURING PRODUCTION OF THE VIDEO DISC VERSION OF *INTO THE WOODS*.

Standing ROM Only

Into the Woods, Warner New Media's newest CD ROM disc project, is markedly different from all previous music-exploration discs: its subject is a popular Broadway musical, written by a living composer. Pulitzer prizewinner and Mac enthusiast Stephen Sondheim narrates the Into the Woods disc himself; he's also the composer and lyricist of such musicals as *Sweeney Todd*, *Follies*, and *A Little Night Music*. Because the disc will contain much live video (using Apple's QuickTime technology), the producers filmed Sondheim in a Manhattan studio as though they were shooting a movie.

Featuring the complete sound track from the musical *Into the Woods*, conversations with librettist Jim Lapine, and a special animated surprise, the Into the Woods disc is expected to ship in December.

—DAVID POGUE

TREND

Publishing Systems Proliferating

Quark recently announced that it is developing QuarkDispatch and QuarkCopyDesk, a multiuser server-based system for managing publishing work flow (see "Quark's Publishing System," *Macworld News*, February 1992). Other Macintosh-based publishing-management systems are being developed. Quark, 303/934-2211.

Odesta is creating Matrix, a turnkey system based on Odesta Document Management System (ODMS is a developers' tool kit for creating many kinds of document-management systems). Matrix resembles the Quark system in providing control over who creates and edits documents and in what order. But instead of providing text-entry and page-layout features, Matrix manages distribution and tracks revisions of documents created in other applications. Price depends on configuration. Odesta, 708/498-5615.—D.L.

BUG REPORT

Microsoft Word 4.0 Incompatible with Macintosh Quadras. Microsoft will develop a fix for users who don't upgrade to Word 5.0. Ship date not set at press time.

QuicKeys 2.1 Sluggish performance under System 7 interferes with some operations; quirky with virtual memory. CE Software expects bug-fix version, 2.11, to be available online by press time. CE may also mail bug fix to users who request it.

Double Helix 3.5 Incompatible with virtual memory. Odesta will ship bug-fix version, 3.5m1, to all registered users. Ship date was not set at press time.

Alias Sketch 1.01 Alias has halted shipment of Sketch. Alias will send the bug-fix version, 1.02, to all registered users when it is completed.

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Circle 294 on reader service card

News

BETA WAIT

Long-awaited products

ACIUS's 4D Server
Shown publicly January 1991; current ship dates projected: spring 1992 in France, three months later in United States.

FoxPro/Mac
Discussed publicly winter 1990/91; Fox says will go to beta soon, no ship date projected.

FoxGraph/Mac
Shown publicly August 1989. In development, no ship date projected.

Interleaf 5
Discussed publicly October 1990; current ship date projected: summer 1992.

Claris's MacWrite Pro
Announced spring 1991; current ship date projected: late spring 1992.

AEC's FilePower
Announced August 1991; planned to ship winter 1991/92; current ship date projected: summer 1992.

Quantum's High-Capacity Removable Drives

Quantum Corporation has introduced a series of high-capacity removable hard drives intended for high-security applications. The main difference between these drives and removable-cartridge drives made by SyQuest and Iomega is that the Quantum PassPort XL devices are entire hard drives that plug into a specially designed external drive chassis. That means there's more to lug around if what you really want is portability, but the PassPort XL series can also be useful if you want true Winchester drive performance in a mechanism you can also lock in a safe. The drives have effective access times as low as 9ms and can transfer 1.4MB per second continuously.

The 50MB PassPort XL lists for $449, the 105MB version lists for $629, the 120MB model lists for $899, and the 240MB drive for $1099. The external drive chassis (which is required) lists for $469. The two lower-capacity drives were scheduled to ship in January, with the higher-capacity drives to follow in March. Quantum, 408/894-4000.—T.M.



TOM GIBSON

THE QUANTUM PASSPORT XL SERIES OF HIGH-CAPACITY REMOVABLE DRIVES RANGES FROM 50MB TO 240MB.



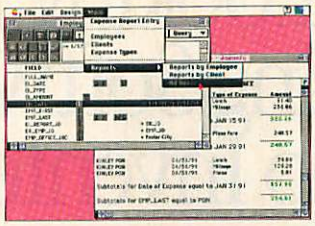
LUIS DELGADO

THE DATAPRODUCTS LZR 1560 CAN PRODUCE DOCUMENTS AS LARGE AS 11 INCHES BY 17 INCHES AT 400 DPI.

Large-Format 400-dpi Laser Printer

Dataproducts Corporation has announced the LZR 1560, a 400-dots per inch PostScript Level II laser printer that can produce documents as large as 11 inches by 17 inches at 8 pages per minute. The LZR 1560's print rate is 15 ppm for 8½-by-11-inch pages. It can also print at 300 dpi if desired.

Slated to ship at the end of January, the LZR 1560 will retail for $5695 with one paper tray, $6495 with two paper trays, and $6995 with three paper trays. The printer comes with 4MB of RAM and has an AppleTalk interface, an RS-232C serial port, a Centronics parallel port, and a SCSI interface for connecting a hard drive directly to it. Dataproducts, 818/887-8000.—T.M.



OMNIS 7'S AD HOC REPORTING FEATURE LETS USERS GENERATE REPORTS THAT THE DATABASE DESIGNER MAY NOT HAVE PLANNED FOR.

Omnis, NuBase Upgraded

New Era acquired Ashton-Tate's dBase Mac, changed its name to nuBase, and cleaned it up (see *Macworld*, *Reviews*, January 1992). Version 1.5 is a major upgrade adding 75 commands to the programming language and an improved forms-design interface. Its price remains $295. nuBase LAN will be available soon. New Era's new phone number is 305/253-9033.

Blyth Software has split Omnis into two product lines: Omnis 7, for Mac- and Windows-compatible database applications, and Omnis 7 Plus, with tools to integrate Omnis into SQL database servers. Both support new data types, including binary large objects such as audio, video, and executables, and list arrays. Omnis 7 lists for $1250, and Omnis 7 Plus for $2500. Demonstration kits are available. Blyth, 415/571-0222.—D.L.

ANALYSIS

Interactive Evolution

Is interactive media the best form for telling nonlinear stories? If so, then the story of evolution should be its ideal subject, because few stories are less linear. With the interactive medium's nonlinear form in mind, the American Museum of Natural History in New York is installing interactive, Macintosh-based exhibits in its Hall of Human Evolution and Biology now under construction. The Hall was designed by the museum's Willard Whitson, and three of the interactive exhibits—Primates, Mammals, and DNA—were designed and produced by independent interactive media specialist Sherman Sall.

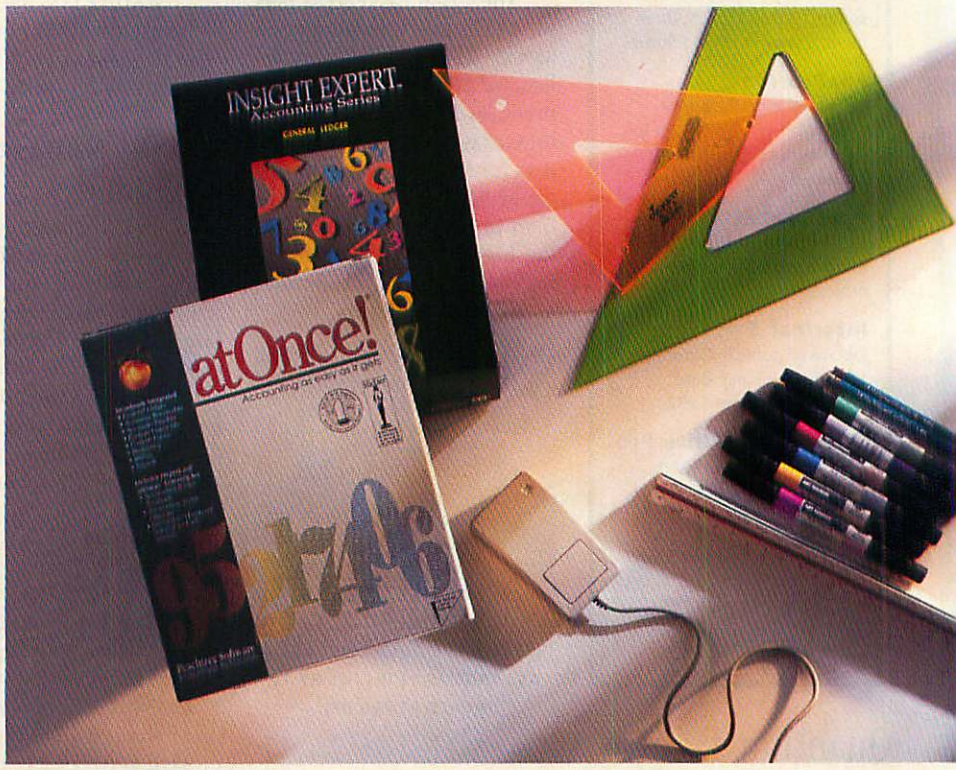
Interactive media is definitely a good medium for museums, where visitors drift toward whatever catches their attention. Primates, DNA, and Mammals each have an attract loop, a video sequence designed to draw viewers' attention. All three include music, narration, and a center-screen video window surrounded by touch buttons for selecting options. Primates is done in green tones with an Amazon rainforest backdrop, Mammals is done in red tones with a sunset backdrop, and DNA is done in black tones with a backdrop evocative of the human body. Footage was licensed from the BBC, National Geographic, Film Australia, and other organizations and individuals.

The display system is a Mac IIfx with System 7 and 20MB of RAM, a RadiusTV with a Radius GX accelerated 24-bit video board, and a Pioneer 4200 laser disc player. The software platform is MacroMind Director. Adobe Photoshop, Swivel 3D, and Infini-D were used to add graphics and special effects. Sall says that his greatest technical challenges were creating smooth, quick transitions between program segments and displaying photo-realistic graphics and smooth animations on the Macintosh in real time, despite the sizes of the files. American Museum of Natural History, 212/769-5000.—ANN GARRISON

If You're Looking For The Best Mac Accounting Software, Look To The People Who Invented Mac Accounting.

Back in 1984, as Apple was sowing the seeds of a revolution, we introduced a pretty revolutionary idea of our own: the first accounting software for the Macintosh.

Since that time, we've continued to search for ways to make Mac accounting even more productive. The result is atOnce!®



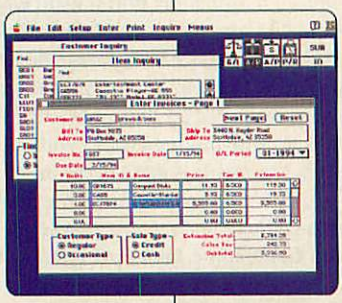
Rave Reviews From The People Who Know Best.

Macworld called atOnce! "an excellent choice for beginning accountants." MacUser gave it four and one-half mice. But don't just listen to the reviewers. Ask your accountant about atOnce! He'll tell you it's the next best thing to having an accounting teacher at your side.

ASK YOUR ACCOUNTANT

What The Mac Did For Computing, Peachtree atOnce! Does For Accounting.

You don't have to be a CPA to figure this program out. For $249, it combines all the functions your small business needs – General Ledger, Accounts Receivable, Billing, Accounts Payable, Payroll, and Custom Forms Design – in one powerful package. As well as an on-line accounting textbook and glossary that take the mystery out of small business accounting. There's even an on-line tutorial.



Insight Expert Accounting®: The Power To See Beyond The Numbers.

For even more in-depth analysis, consider the Insight Expert series of advanced Mac accounting modules. They not only crunch numbers, they analyze data and forecast trends. Plus, a remarkable "zoom" function lets you instantly view the detail of any graph by double-clicking. All for $395 per module.

Designed For The Macintosh.

Peachtree's atOnce! and Insight Expert were designed for the Mac – not grafted from a DOS platform. Maybe that's why they've won more awards than any other Mac accounting software.

Of course, we back all our Mac products with 30 days of free support and a money-back guarantee. So see your local dealer or call PeachLine at (800) 443-9361.

Peachtree®

The first name in small business accounting software.™

MacUser EDITORS' CHOICE AWARD WINNER

MACWORLD Mouse 1990 World Class Award Winner

PCWORLD World Class Award Winner

★★★★½

☎ *PEACHLINE. There's no way we could squeeze all the features of our Mac accounting products into one ad. So if you'd like to talk with a Mac-literate human being about your specific needs, or you'd like a free catalog, call (800) 443-9361.*

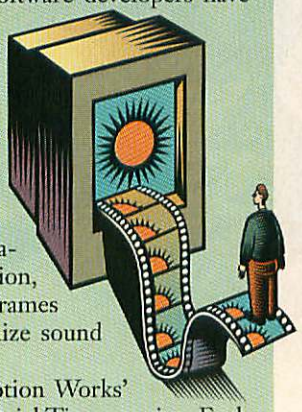
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Circle 100 on reader service card

TREND

Presentation Software QuickTime-Ready

Vendors are scrambling to add QuickTime support to their products—even to business software that has no earthly use for it. Oddly, presentation software developers have been slow to support QuickTime, but that's rapidly changing. PowerVision, new from KnowledgeVision, plays back QuickTime movies within presentations, exports files in PICS format, and outputs to videotape.



PETER HOEY

PowerVision uses a storyboard metaphor and offers animation tweening, built-in acceleration, and playback rates of up to 30 frames per second. It also can synchronize sound to video.

Vividus's Cinemation and Motion Works' ProMotion import and export QuickTime movies. Each of the three products lists for $495. At least six other presentation packages will support QuickTime soon.

KnowledgeVision, 803/272-4483; Motion Works, 604/685-9975; Vividus, 415/494-2111.—EVAN COOPER

NuBus Expansion for Quadras

For those who need more slots than the Macintosh Quadras provide, there's the Expanse NB8, an 8-slot NuBus expansion chassis from Second Wave. Compatible with the Quadra 700 or Quadra 900, the Expanse NB8 has its own 130-watt power supply. It connects to the Mac through a board that occupies one internal NuBus slot in the Mac.

The Expanse NB8's bus clock can be upgraded to 20MHz for faster data-transfer rates. The chassis is currently shipping at a retail price of $2295. Second Wave, 512/343-9661.—T.M.

Low-Cost Large-Screen Color

Micro Business Solutions (MBSI) has announced the combination of a 19-inch color monitor and an accelerated 24-bit graphics board that will retail together for $2895. The monitor is the RealTech 19" Trinitron, which offers 1024 by 768 resolution and a 75Hz vertical refresh rate. The accelerated board is the RT-24, which holds up to 16MB of RAM for speeding performance or manipulating GWorlds.

The 24-bit monitor and board combination began shipping in early December. MBSI, 409/539-3959.—T.M.

Mass Micro 3½-Inch Optical Drive

Mass Microsystems has joined the march toward 3½-inch erasable optical storage with its DataPak MO/128, a 128MB magneto-optical drive that comes in external and internal versions. The drive has an average access time of 30ms, according to the company, and is compatible with the ISO and ANSI standards for 3½-inch optical drives.

The external model of the DataPak MO/128 will list for $1795, while the internal drive will list for $1495. Both models should begin shipping in early February. The company will sell the removable cartridges for $129 list price. Mass Microsystems, 408/522-1200.—T.M.

News

The Big Picture Frame

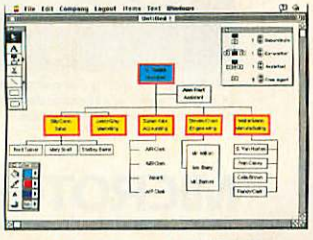
Frame-relay products now available use digital lines to link distant Macintosh networks into an extended local area network. A special router places routing frames around packets generated by AppleTalk and Ethernet and links each user site to the frame-relay service provider. With throughput of up to 1 megabit per second, these systems make a branch office halfway across the country appear to be just a Chooser zone away.

Frame-relay pricing varies widely. WilTel's (800/642-2299) package deal includes a router for about $2000 a month per site. CompuServe Network

continues

The Organization Plan

Using draw software like MacDraw or Canvas to design and revise organizational charts is deadly tedious. Kaetron, which publishes the flow-chart package TopDown, is currently developing software to streamline making org charts.



AN ORGCHART EXPRESS DIAGRAM WITH BLANK POSITIONS AND WORKGROUPS. THE TOOL PALETTE'S ARROWS CAN REARRANGE POSITIONS.

Kaetron's OrgChart Express keeps a database of information about positions and the people who fill them. That makes it possible to leave empty positions on the chart, and to chart people reporting to peer-level project leaders or multiple supervisors. Appearance of nodes on the chart and relationships can be controlled in a manner similar to applying style sheets in a word processor. Price had not been set at press time. Kaetron, 713/890-3434.—D.L.

DESKTOP LIBRARIAN

Books on PageMaker

This month we examine some books on PageMaker 4.

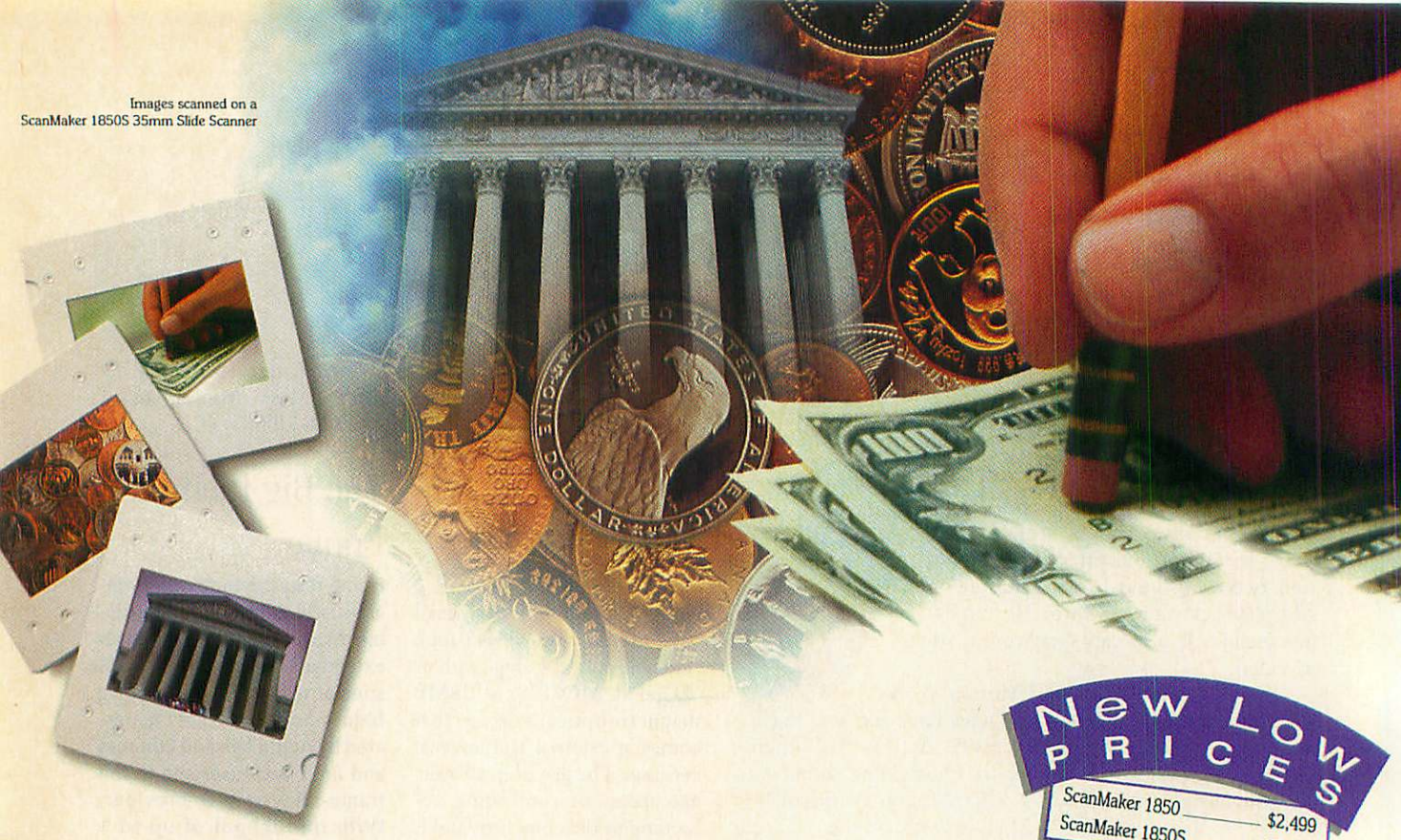
- ***PageMaker 4 by Example for the Macintosh***, by David Webster and Tony Webster (1990, $34.95). This book is organized into 12 modules, starting with the basics and moving to advanced features. Each module includes an instructional portion followed by self-paced hands-on exercises on that module's topic. M&T Publishing, 415/366-3600.
- ***PageMaker 4.0 for the Macintosh Made Easy***, by Martin Matthews and Carole B. Matthews (1990, $19.95). This volume is divided into three sections, the first of which is a general tutorial. The next section shows you how to make business forms, brochures, and financial reports. The last section leads you through the making of a newsletter and part of a catalog. Osborne/McGraw-Hill, 510/549-6660.
- ***Real World PageMaker 4: Industrial Strength Techniques***, by *Macworld* contributing editor Steven Roth and Olav Martin Kvern (1991, $26.95). ***Real World PageMaker 4*** starts off with a chapter called "What's New in PageMaker 4," which assumes some knowledge of PageMaker. The book is intended to show the correct methods of using PageMaker 4, but goes on to demonstrate lots of techniques for stretching the limits. Bantam Computer Books, 212/765-6500.—T.M.



SCOTT PETERSON

THREE BOOKS ON PAGEMAKER 4 FOR THE MACINTOSH: ALL TAKE VERY DIFFERENT APPROACHES.

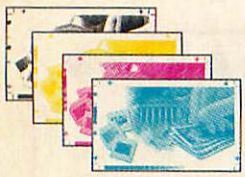
Images scanned on a
ScanMaker 1850S 35mm Slide Scanner



New Low Prices

ScanMaker 1850	$2,499
ScanMaker 1850S	$2,699

Microtek removes the biggest barrier to owning a Slide Scanner



If price has been the barrier separating you from high quality color scanning, take a look at the ScanMaker 1850.

Another stunning price breakthrough from Microtek, the leader in affordable color scanning solutions.

The ScanMaker 1850 sports a formidable set of specs. 35 x 35mm scanning area. 24-bit color. 8-bit gray-scale. 1850 dpi resolution.

Best of all, it's so easy to use. Just drop in any slide and you're ready to start scanning.

The ScanMaker 1850 gives you everything you need to go from comps to final color separations. It even comes bundled with PhotoStyler for the PC or Adobe Photoshop for the Mac.

But wait, it looks even better when you see the price. Just $2,499 for the ScanMaker 1850 on the PC. And only $2,699 for the Mac compatible ScanMaker 1850S.

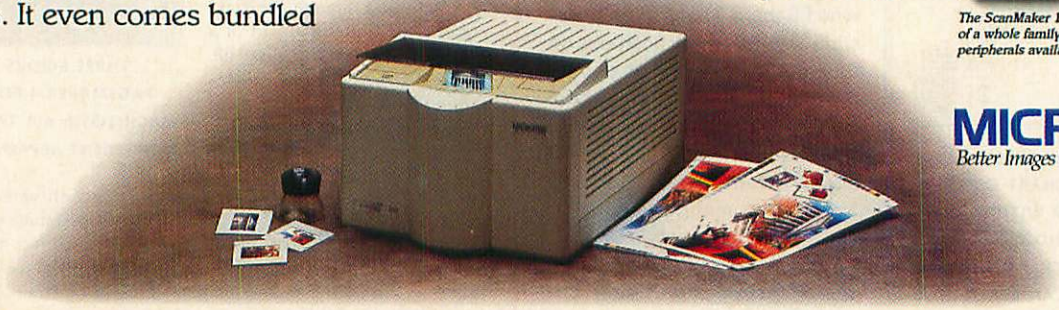
24 bit Color 1850 DPI

Call 1-800-654-4160 or 213-321-2121 in California for the name of the Microtek authorized dealer nearest you.

Because the only barrier between you and a 35mm color scanner now is a toll-free phone call.



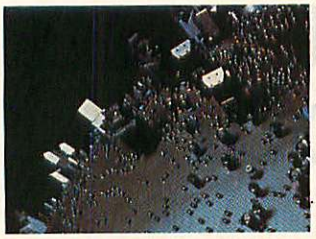
The ScanMaker 1850 is just one member of a whole family of affordable desktop peripherals available from Microtek.



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Services (800/433-0389) also provides frame-relay service. Cisco Systems (415/688-8200) sells EtherTalk-to-frame relay routers and will have a LocalTalk version by summer.
—CARL ALEXANDER



CLOSE-UP OF A STAR BALL. THE PROTRUDING LENSES PROJECT BACKGROUND STARS ON THE DOME OF THE PLANETARIUM.

The Mac-Driven Planetarium

Planetariums perform a lot of behind-the-scenes work to send showgoers hurtling through space. Spitz, Inc., which has been designing and installing planetariums for more than 30 years, is now using Macs to control the planetariums it installs.

After a planetarium operator uses Spitz's Space Voyager software to choose a point of view and set a flight path through the planets, the Mac calculates how to display the heavenly bodies in proper perspective and then transmits commands to another computer that controls the star ball, the device that projects the skies onto the dome. Shows can be stored and played back, or the planetarium can be operated live. Spitz, 215/459-5200.—D.L.

TURKEY SHOOT

EARLY SIGHTINGS OF PROBLEM PRODUCTS

Alias Sketch Copy protection returns from the grave. Alias also intends to copy protect its not-yet-shipping Upfront 2.0, which, thanks to bugs in the copy-protection technology licensed from another company, won't run with Alias Sketch under MultiFinder. So much for synergy.

DayMaker Too good to be true? A great product with a serious flaw: no way to schedule recurring events such as weekly meetings (Pastel promises this for the first upgrade).

Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See *How to Contact Macworld.*

ChipSoft's MacInTax

ChipSoft launched TurboTax for the 1990 tax year shortly before acquiring competitor Softview and its MacInTax program. The company has shelved TurboTax and has revised the better-established MacInTax for 1991 at $99.95, with new forms, improved help, and the ability to import last year's TurboTax files. State modules are available for 15 states at $69.95 each. ChipSoft is selling off inventory for the powerful but unsuccessful forms package if:X, also acquired in the Softview buy-out; ChipSoft may upgrade if:X in 1992. ChipSoft, 619/587-3939.—D.L.



LET YOUR FINGERS DO THE WALKING: YOU CAN TRAVEL ABOUT INSIDE THIS ONLINE MUSEUM BY POINTING AND CLICKING.

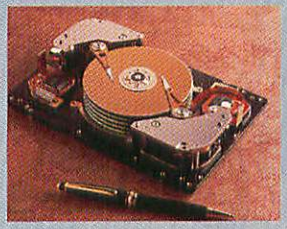
The Virtual Museum

Have you ever longed to get lost in the Louvre on a rainy Sunday, if only you lived in Paris? In the future you may be able to anyway, and you won't have to fight the crowd to get close to the *Mona Lisa.* Apple has developed a digital production called the Virtual Museum, which allows users to make their way through "halls" devoted to astronomy, plants, the environment, and medicine, clicking on exhibits to see close-ups and supplementary video, animations, and text. The prototype uses QuickTime and contains more than a gigabyte of video compressed into 95MB.
—ANN GARRISON

TREND

Super-Fast Drives on the Horizon

Conner Peripherals has announced early shipments of its 510MB Chinook CP-5500, the first in a series of very fast 3½-inch hard drives that have two read-write heads—much better than one. The read-write heads are on opposite sides of the disk so that the desired data is never very far from being read. And each head can read or write data independently of the other, nearly doubling performance. The Chinook series also includes a SCSI-2 implementation, for higher data-transfer rates. The CP-5500 should soon be available from third parties who will relabel it under their own names. Evaluation models are going for $1595 to volume buyers, but list prices could not be predicted at press time.—T.M.



CONNER PERIPHERALS' CHINOOK SERIES OF HARD DRIVES HAVE TWO INDEPENDENT READ-WRITE HEADS FOR GREATER SPEED.

News

Pixar: Nice as ICE

Pixar is developing a PostScript dialect that it hopes will become the standard for manipulating bitmapped images. Image Computing Environment, or ICEman, includes a pixel-array data type that abstracts groups of pixels into objects, just as standard PostScript abstracts lines and curves into objects. Pixar says ICEman will enable programmers to develop paint programs, medical-imaging software, and similar applications, without having to write

continues

VIRUS WATCH

CURRENT VIRUSES, TROJAN HORSES, AND WORMS AFFECTING THE MACINTOSH COMMUNITY

Zuc C

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 10/91
INFO: A Zuc clone
IMPACT: Nondestructive; infects applications and system files; renders cursor inoperable

HC

TYPE: Data Virus
FIRST LISTED IN VIRUS WATCH: 6/91
INFO: Infects HyperCard stacks
IMPACT: Causes the Mac to hum oddly

nCam

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 5/91
INFO: An nVIR clone
IMPACT: Nondestructive; infects applications and systems files; can cause crashes

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All of it gathered while you're attending a meeting or writing a report.

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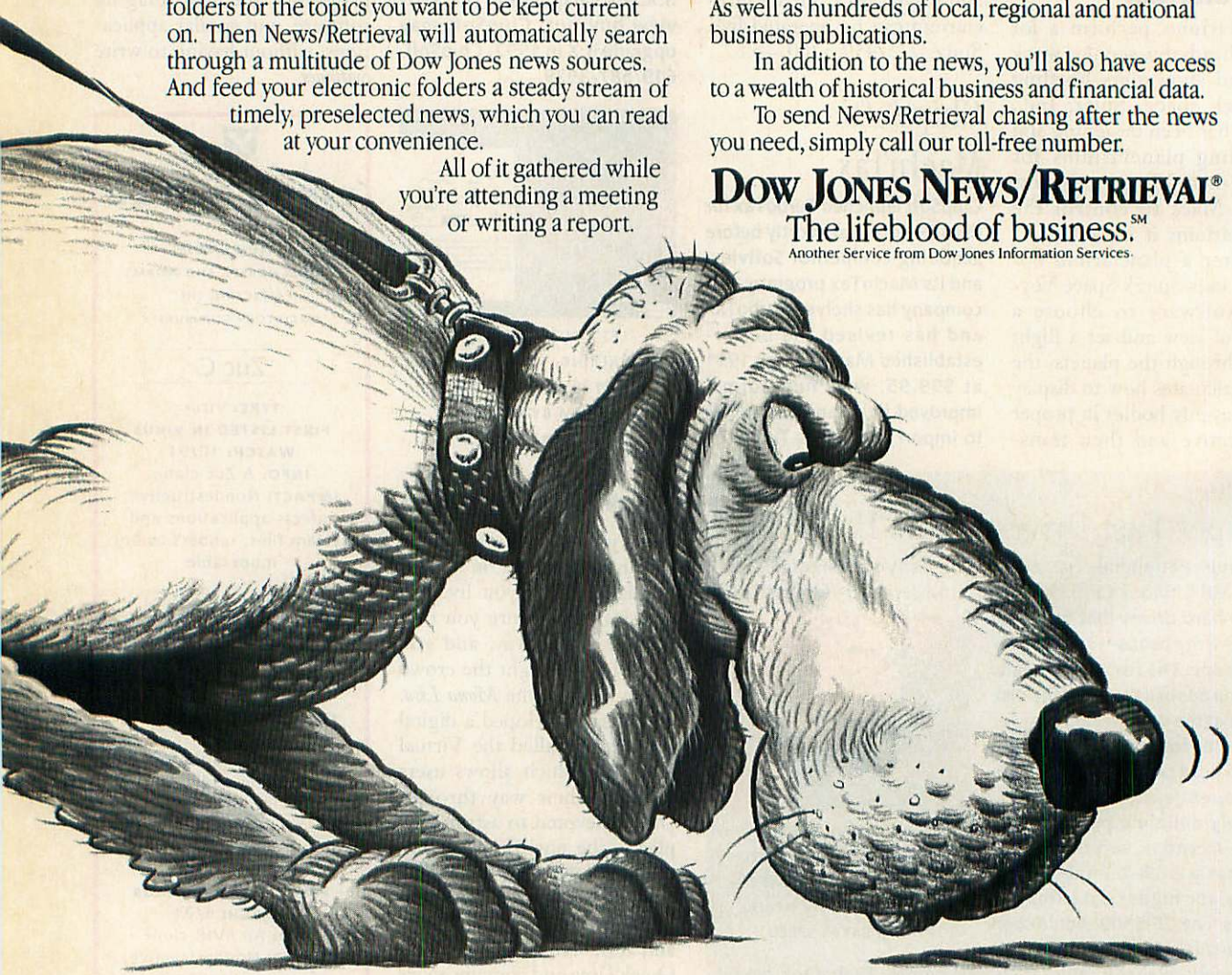
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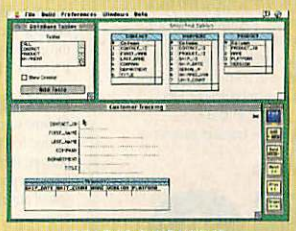
TREND

Big Databases for Macs

The trend toward providing Mac access to the corporate database—or running the corporate database on a Mac—is accelerating with several new products.

Information Builders is adding Mac support to its Enterprise Data Access/SQL product, which accesses 45 database systems on 35 platforms.

EveryWare's Butler is a SQL server and development tool that runs on the Mac. Version 1 can read only Butler tables; later it will also support external data.



BRIO'S DATAEDIT CREATES A DATA ENTRY FORM AS YOU DRAG FIELD NAMES FROM A TABLE IN A MAINFRAME DATABASE.

Brio's DataEdit can create forms using fields in multiple tables in a SQL database running on other platforms, and unlike other data-access tools, DataEdit lets a user enter new data.

Pricing depends on configuration. Brio, 415/961-4110; EveryWare, 416/819-1173; Information Builders, 212/736-4433.—D.L.

code for manipulating individual pixels.

Pixar says that so far no Macintosh software companies have expressed an interest in using ICEman technology, which is scheduled for alpha testing this winter.—D.L.

Polaroid 500-dpi Scanner

The CS-500, a 24-bit, 500-dpi scanner from Polaroid Corporation, can scan color images that measure up to 4 inches by 6 inches in about 12 seconds. Intended for image-intensive applications such as document processing, image databases, or desktop publishing, the CS-500 has an automatic feeder so the user does not have to open and close a lid constantly.

Available now, the CS-500 has a suggested list price of $3495. The scanner works with pictures taken by a Polaroid instant camera and is not intended for transparencies. Polaroid Corporation, 617/577-2000.—T.M.



POLAROID'S CS-500 SCANNER AUTOMATICALLY SCANS COLOR IMAGES AS LARGE AS 4 INCHES BY 6 INCHES IN 12 SECONDS.

Nutmeg Boards Spice Up a Classic

Nutmeg Systems has introduced two graphics adapters that install easily in a Mac Classic to support an external monochrome monitor. One of the boards drives the Nutmeg 19-inch Display; the other works with the Apple Portrait Display. Either board can fit into the SIMM sockets on the Classic's logic board, so clipping directly onto the processor—sometimes a chancy thing—is not necessary. The boards have a pass-through connector, so you can still add the same amount of RAM into the Classic as always.

Both of the boards are currently shipping, and both list for $399. Nutmeg, 203/966-3226.—T.M.

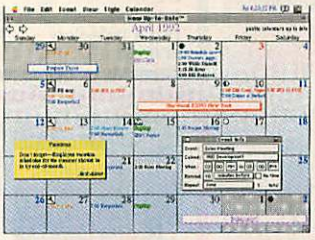
Low-Stress Typing

Sara Keys is a $20 software keyboard emulation that, its developers say, reduces repetitive finger motion and alleviates stress-related injuries such as carpal tunnel syndrome. Sara Keys' developers analyzed a 100 million–character database of typical modern documents to determine the most common words and letter pairs. With a physician, the developers designed a configuration that minimizes finger travel and ensures that both hands do equal work. Sara Systems, 505/525-9672.—B.J. NOVITSKI

Now's New Calendar

Now Up-to-Date is a calendar manager for single and networked users that provides reminders, supports repeating events and remote log-in, and can print in several popular loose-leaf notebook sizes.

Networked users keep separate calendars but can create a consolidated view of several people's calendars. Users can set font, color, and other formatting, and add floating text blocks. Unfortunately, Now Up-to-Date cannot display blocked-out times without showing what is scheduled for a time slot. It also does not provide filters based on event or task type—for example, it can't display a list of phone calls to make today.



A NOW UP-TO-DATE CALENDAR SHOWING THE PHASES OF THE MOON, A NEW EVENT ABOUT TO BE ADDED, AND A YELLOW TAG PASTED ON TOP.

Now Up-to-Date is $99 for one person, $399 for a five-pack, and $599 for a ten-pack. Now Software, 503/274-2800.—D.L.

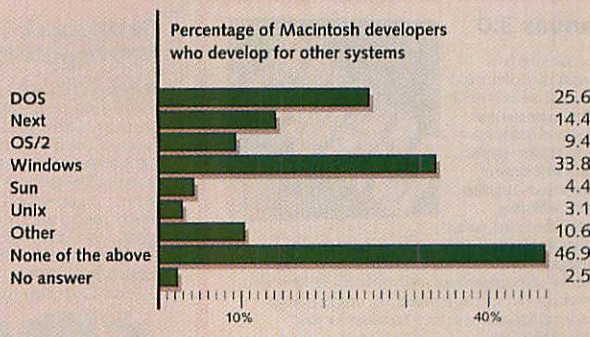
News

DoveFax Goes Internal

Dove Computer Corporation has introduced internal versions of its popular DoveFax and DoveFax+ fax modems. The DoveFax for NuBus sends and receives faxes at 9600 bps, and it sends and receives as a 2400-bps modem. The internal fax modem can operate in the background, can delay transmission until a more convenient time, and can group and schedule calls. The DoveFax+ for NuBus has the same fax and modem speeds as the DoveFax for NuBus and the same software features, but also has voice-messaging capabilities.

The DoveFax for NuBus lists for $449; the DoveFax+ for NuBus lists for $599. Dove, 919/763-7918.—T.M.

Reader Survey: Macintosh Developers



This month's survey is based on 160 usable returns from a mailing to CEOs and presidents of third-party Macintosh developers.

Mac WAREHOUSE

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Hayes Personal Modem 2400 Plus with Smartcom

The Hayes Personal Modem 2400 Plus provides you with everything you need to go on-line. This 2400 baud modem has a built-in call-monitoring speaker and two LEDs, plus both phone and computer cables. Included in the package is the Smartcom terminal software to make using your modem simple and convenient. It fully supports the Mac interface. Also emulates popular terminals, such as TTY and VT52/102, to make mainframe and mini access easy. File transfer protocols include XModem and MacBinary.

Manufacturer: Hayes MOD0060

$149

KaleidoKubes



Challenging yet easy to play. KaleidoKubes appears simple at first, but as the game board grows, it becomes complex. Every game is different, because you actually create the game board as you play.

ENT0417 $19.

Bridge 6.0

Now you can play a rubber of Bridge 6.0 with the Mac's three players. Bridge 6.0 handles all the bookkeeping and tactfully informs you of any mistakes in bidding or play. Even saves hands for replaying and analysis.

Publisher: Artworx
ENT0303

$29

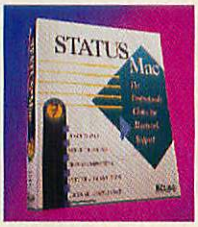


Lotus 1-2-3 For Macintosh

At last, a 1-2-3 spreadsheet that is designed exclusively for the Macintosh computer. 1-2-3 for Macintosh takes full advantage of the rich graphical environment of Macintosh while delivering significant new spreadsheet features. And of course it's compatible with other new versions of 1-2-3 and Excel. A whole new kind of 1-2-3 created expressly for Macintosh. The result is a rich design that makes even the most complex spreadsheet tasks easy. 1-2-3 for Macintosh sets a new standard for what a Macintosh spreadsheet should be. System requirements: any Macintosh with a hard disk. 2MB RAM under System 6 or later. 3 MB RAM under 7. **Publisher: Lotus Development BUS0188**

$329

STATUSMac 2.0 for Small Networks - 25 Users



STATUSMac 2.0 gathers information about all the Mac hardware and software on your network, and provides an extensive profile of each connected Mac, whenever you need it. Compiles the profiles into a single database to provide a complete inventory and comprehensive overview. Helps to identify users with printer driver conflicts, extra System folders, INIT conflicts, or outdated antivirus utilities. Best of all, STATUSMac does all this remotely. Supports up to 25 Macs from one station.

Publisher: Pharos Technology NET0156

$299

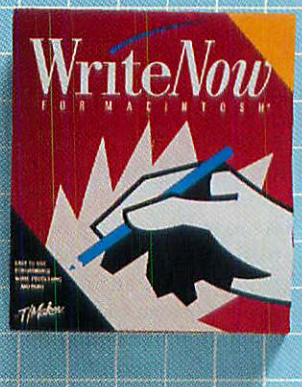


WristSaver/ WristSaver MousePad

The WristSaver cradles your wrist with a contoured neoprene rubber pad and a nylon covering. It's ergonomically designed to support your wrist at the proper angle to help avoid the pain associated with Carpal Tunnel Syndrome. The WristSaver MousePad provides a comfortable rest for your wrist, plus a conventional mouse pad. Simple finger movements replace sliding the entire arm or hand.

Manufacturer: LB Innovators
***WristSaverMousePad* ACC0635 $18.**
***WristSaver* ACC0560 $18.**
***Bundle* BND0033**
(Available in Gray, Black, Red or Navy)

$29

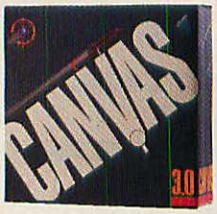


WriteNow®, Grammatik™ Mac and MacTools® Deluxe

T/Maker's Promo Pack - a $427 value for only $99. Never has so much value been delivered at such a low price! WriteNow®, a two-time Eddy award winner for word processing, comes with a full version of Grammatik™ Mac 2.0, one of the best-selling grammar/style checker (a $99 value) and a full version of MacTools® Deluxe, the data protection and file management utility, (a $129 value) FREE! All three applications are System 7 compatible! WriteNow® 2.2 offers all the features you expect in a word processor and includes one of the largest dictionary/ thesaurus combination in the Macintosh world! While Supplies Last! **Publisher: T/Maker WRD0018**

$99

Canvas 3.0



Canvas 3.0 is fast, powerful, easy to learn and provides all the tools you'll need to create and print professional quality color or monochrome graphics. Use in a wide range of design projects including desktop publishing, technical illustration, design graphics, architectural rendering, engineering drawing, presentations, multimedia and general business graphics. Canvas 3.0 offers unparalleled productivity. Create illustrations from scratch with our new freehand tool, or scan existing artwork and let Canvas auto trace its outlines for you. System 7 Savvy!

Publisher: Deneba Software GRA0280

$249

Retrospect 1.3 or Retrospect Remote

For power and simplicity in backup, there's Retrospect. Set it up once, and a built-in calendar backs you up again and again, even when you're asleep. Retrospect supports all disk, tape, cartridge and optical devices, so you can decide which storage media best suits your needs. For centralized network backup, there's Retrospect Remote. It works just like Retrospect, only it backs up everyone on a network to a single storage device. Your whole network gets Retrospect protection automatically. Let your backup expand as your network grows by adding Remote 10-Packs.

Publisher: Dantz Development
***Retrospect 1.3* UTI0227 $147. *Remote 10-pack* UTI0200 $147. *Retrospect Remote* UTI0196**

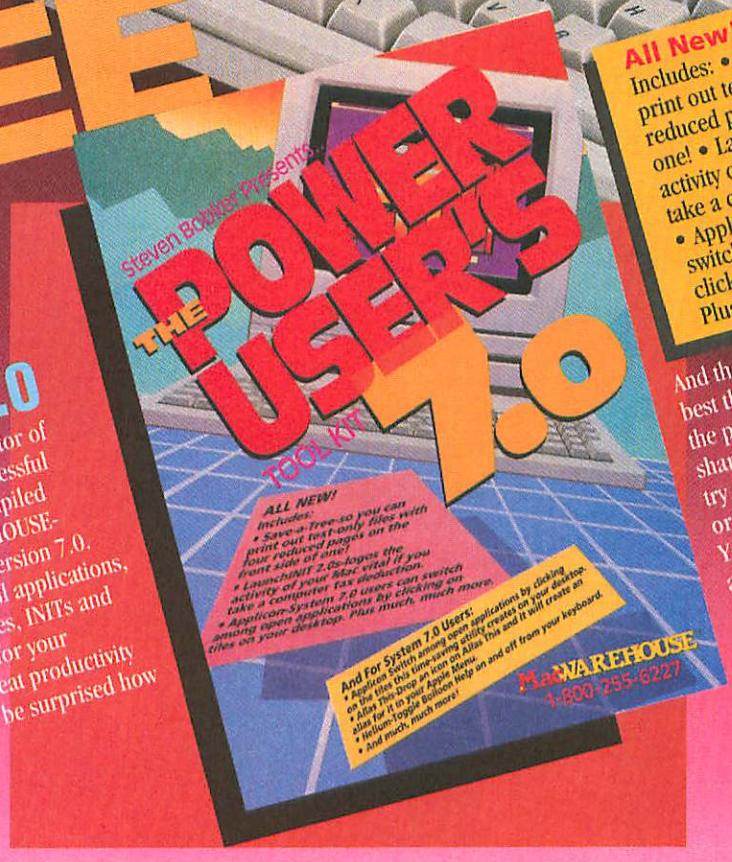
$264



Circle 270 on reader service card

FREE POWER USERS TOOL KIT 7.0

If you're not already a collector of Steven Bobker's highly successful Power User's Tool Kit -compiled exclusively for MacWAREHOUSE- you'll want to start with version 7.0. It's stuffed with ten useful applications, utilities, desk accessories, INITs and System 7.0 extensions for your Macintosh. They're great productivity enhancers and you'll be surprised how easy they are to use.



All New!
Includes: • Save-a-Tree- so you can print out text-only files with four reduced pages on the front side of one! • LaunchINIT 2.0s - logs the activity of your Mac - vital if you take a computer tax deduction. • Applicon - System 7.0 users can switch among open applications by clicking on tiles on your desktop. Plus much, much more.

And the best thing is, the programs are shareware so you can try them FREE when you order from MacWAREHOUSE. You pay only $1.50 shipping and handling if you want the disk. If you wish to continue using the software, some authors ask that you pay a small fee ($5-$25). All the details are explained on the disk, which is yours to keep. Please remember to ask for item # AAA 0013 when you order.

White Knight V.11

The perfect low-cost solution to almost any Mac telecommunicator's needs. Offers the kind of power associated with products costing hundreds of dollars more, but is easier to learn and more flexible. 270+ page user manual is geared to all levels of experience. Winner of 11 awards including MacWorld's World Class Software Award 1987-1991.



Publisher: FreeSoft
COM0060

$85

Metamorphosis Professional 2.03



Now convert your Macintosh fonts to IBM-compatible & NeXT fonts! Metamorphosis® Professional converts PostScript® Type 1, Type 3, and TrueType fonts from the Macintosh to IBM-Compatible PCs running Windows 3.0 or greater and ATM; converts PostScript Type 1, type 3, and TrueType fonts from the Macintosh to Type 1 on the NeXT® workstations; and converts PostScript and TrueType typefaces into PICT and EPS outlines for use in a variety of your favorite drawing programs. Metamorphosis Professional is a "must have utility" for anyone working with type!

Publisher: Altsys
FON0284

$89



M.Y.O.B. 2.1

M.Y.O.B. 2.1 is an INCREDIBLE ACCOUNTING SOFTWARE system for small to medium size businesses. Features include fully integrated general ledger, A/P, A/R, inventory , checkbook and card-file. Gives you features not found in accounting packages costing hundreds of dollars. Great Value!

Publisher: Teleware
FIN0087

$139

FontMonger



FontMonger is the universal font utility for modifying, enhancing and converting typefaces. Change height, width and slant of a font's characters to create new fonts! Copy and paste to reassign characters on your keyboard or build a new font. Create fractions or composite characters and install them into your font. Import or export characters or fonts as EPS files for working in Illustrator or Freehand. FontMonger even lets you convert formats between PostScript Type 1, Type 3 and TrueType.

Publisher:
Ares Software FON0361

$62

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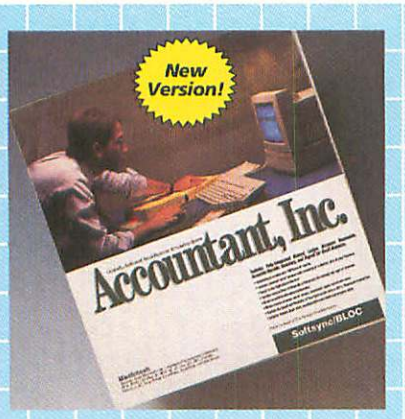
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Accountant, Inc. 3.0

"Accountant, Inc. is the most complete integrated accounting and financial management package for the Mac" says MacUser magazine. It's easy to use and gives you exceptional streamlining power. You only have to enter information once. Every transaction is automatically posted to your General Ledger. Accountant, Inc.'s new revolutionary System 7 design gives you the advantage of customizing your forms, screens and reports by hot linking with your favorite forms design, spreadsheet and data base programs. You get Invoicing, Accounts Receivable, Inventory, Accounts payable, Check Writing, Integrated General Ledger and Payroll. Accountant, Inc. is now available in single and multi-user versions. **Publisher: SoftSync, Inc. FIN0048**

$339



More After Dark

It's M.A.D.! It's More After Dark—Over 25 incredible new displays for After Dark, the Ultimate Screen Saver. Features contest winners Mowin' Man, Tunnel, GraphStat, and many beautiful new fish! Kittens, Art Museum, and Lunatic Fringe game module help save your screen from phosphor burn-in. (Requires After Dark software.) **UTI0230 $25.**

After Dark 2.0

After Dark 2.0 displays over 35 screen savers including classics Flying Toasters and Fish! Includes sound, password protection, logo and message display. **Publisher: Berkeley Systems UTI0119 $29.** Buy both and save. **UTI0231**

$45

VocabuLearn/ce

Now available in Level III, and Compact Disc to help expand your vocabulary base with thousands of new words and phrases! ***VocabuLearn/ce*** **$35ea.** ***Compact Disc*** **$69ea.** Full line available.



PICTURE IT!

Penton Overseas has developed a stimulating way to break the global language barrier... **PICTURE IT!** offers a highly interactive "bilingual" approach to a foreign language dictionary...complete with more than 500 high resolution graphics, native pronunciation, and expandable resource file. **Publisher: Penton Overseas** Available in French, Spanish, German & Italian.

$42 ea.

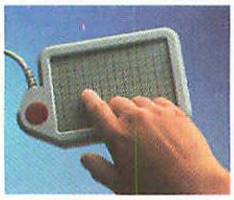


Meeting Maker 10-User

Meeting Maker takes the hard work and frustration out of scheduling meetings. Operating over your LAN, it provides each user with a personal daily calendar, with password protected privacy provisions. When you want to schedule a meeting, it finds the time slots when all the participants and facilities are free and automatically sends out invitations. It collects the responses and can enter the meeting and reserve the time in each person's daily calendar.
Publisher: On Technology
Meeting Maker 5-User **BUS0165 $309**
Meeting Maker 10-User **BUS0166**

$549

The UnMouse



The UnMouse does everything a mouse can—only faster, easier, and in less space. To move the cursor, simply slide your finger over the glass surface. To make a selection merely press down. The UnMouse also serves as an extended keyboard. Tap the large red button and you have a Power Keypad with 16 keys instantly available to execute macros (60 in advanced mode). With its one million touch points the UnMouse also performs as a small graphics tablet. **Manufacturer: Microtouch INP0084**

$159

macBible-King James Version

Revolutionize the way you study the Scriptures with the complete Bible study system for the Macintosh computer. macBible offers the NIV Study Bible Notes, Encyclopedia of Bible Difficulties and much more! Experience fast and efficient Bible study using up to five adjustable, moveable "windows". Fast word searches save you time. A great price saves you money! All modules come with an unconditional 60-day money-back guarantee. **Publisher: Zondervan Electronic Publishing BOK0021**



$79



Universal PowerCache

33, 40, 50 MHZ PowerCache. Here's the affordable way to get the maximum from your software. DayStar's proprietary technology combines a blazing fast 68030 processor with a superfast RAM cache. Now you can get '040 performance with proven '030 compatibility including System 7.0 virtual memory. Accelerates virtually every function in all applications. An optional math chip is a real time-saver for spreadsheet recalcs and scientific tasks. The universal design makes it easily transportable to almost every Mac including the SE/30, II, IIx, IIcx, IC, IIsi & IIci. Guaranteed 100% compatible. **Manufacturer: DayStar Digital See line listings for prices. PowerCache 40MHz DRI0467**

$949

Home Office

Turn your Mac into an answering machine with a new voice feature added to a 2400 bps data/9600 bps send and receive fax modem. Record and play back messages, set up private mailboxes, retrieve messages remotely and more. Modem features V.42bis/MNP-5; also available in a 14,400 bps data version.
Manufacturer: Prometheus MOD0084

$269

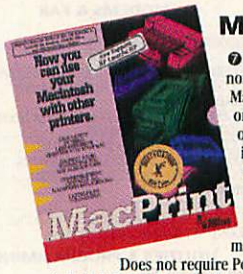


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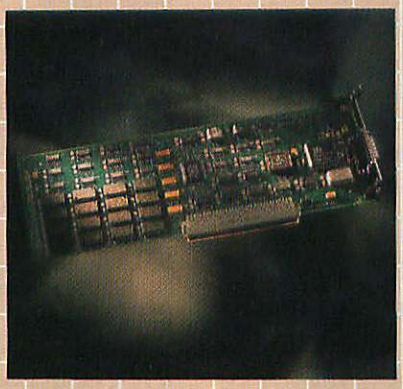
ORDER UNTIL MIDNIGHT(EST) FOR OVERNIGHT DELIVERY



MacPrint 1.3

Use a Macintosh with non-Apple printers. Print Mac applications on HP Laserjet, Deskjet or compatible printers including all Series IIs, IIIs and the Deskjet 500. Prints text and graphics at the printer's maximum resolution. Does not require PostScript. Cable is included. **Publisher: Insight Development UTI0098**

$95



Xceed MacroColor II 24-Bit Video Card

Micron's Xceed™ MacroColor II™ video card for the Mac II family brings a new standard of price and performance to 24-bit color. Based on Micron's exclusive enhanced NuBus® architecture, the MacroColor II achieves nearly twice the performance of Apple's 24-bit card without the need for additional (and costly) acceleration. Made for your standard 13" or 14" monitor, the MacroColor II will display 16.7 million colors at 630x480 resolution. Fully compatible with System 6.0x and System 7, it includes Virtual Video™ desktop expansion utility, MonitorXCEED™ gamma color correction utility and 8/24-bit MacroPaint™ software, plus a five-year registered warranty and unlimited, toll-free technical support. **Manufacturer: Micron Technology DRI0412**

$469

Run PC/Network

Connect any one of 10 Macs to a PC via modem or AppleTalk network to run virtually any DOS program. Run programs at full speed, access VGA graphics, extended/expanded memory and PC peripherals. Copy and paste text or graphics between programs, print DOS files onto your Mac printer. Transfer files, translate documents in either direction and mount DOS disks using included Software Bridge/Mac. **Publisher: Argosy Software, Inc. COM0098**



$279

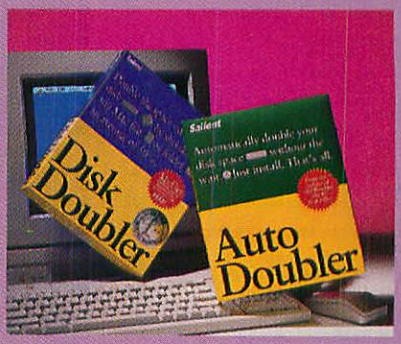
NEW

Star Trek Sound Clips



Enliven your next presentation with these official digital Star Trek Sound Clips. Both volumes include sound effects, music cues, and dialog from Star Trek the Original Television Series. Now, you can slyly slip in the Transporter sound effect for a slide dissolve, or zap the Klingon competition with a phaser blast. They work with most desktop presentation and multimedia applications. The clips also work with SoundMaster (included) to replace those boring Mac System beeps with your favorite Star Trek sounds. **Publisher: Sound Source** ***Unlimited Vol.1: The logical Collection*** **ENT0418 $29.** ***Vol. II: The Final Frontier*** **ENT0419**

$29



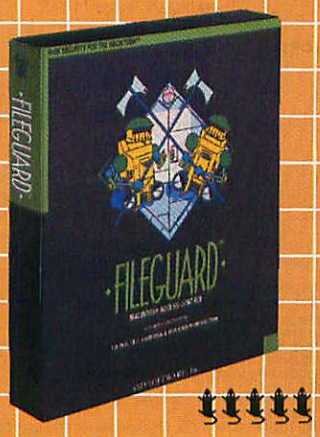
AutoDoubler

AutoDoubler is the easiest way to increase your hard disk capacity. It works in the background to automatically keep your hard disk compressed. It's lightning quick and completely transparent, so it won't interrupt your work. In fact, AutoDoubler's new patent-pending technique lets your Macintosh use files and applications while they are still compressed! It's 100% compatible with all applications, desk accessories, and system extensions. **UTI0254 $49.**

DiskDoubler

gives you total control of file compression-archiving for modem transfer, compressed backups, self-expanding files, and fast copying of files. AutoDoubler and DiskDoubler combined give you the ultimate in speed, convenience, and control. **Publisher: Salient UTI0179**

$49



FileGuard 2.7

"It's sleek, fast, and safe. I highly recommend it." MacUser April 1991. Protect your Hard Drives and Partitions from unauthorized access (including security bypass with a system diskette), copying and erasure; Applications and File/Folders (including system folder) from unauthorized access, deletion, and /or illegal copying; Desktop (including system folder) from alterations by unauthorized user; Keep an eye on System Usage with the system users log which continuously tracks user/group activity. System 7 compatible. **Publisher: ASD Software** ***Office 5-Pack*** **UTI0130 $489.** ***Office 10-Pack*** **UTI0131 $799.** ***Single*** **UTI0135**

$139

Carbon Copy Mac 2.0 Unlimited Users, Apple Talk Only and Single User

Carbon Copy for the Mac allows you to operate another Mac from your own. You can control the remote Mac's screen, keyboard, and mouse, and exchange files. Great for remote support, file sharing, project collaboration, and training. Carbon Copy for the Mac offers password protection, and includes the Virex INIT to ensure virus-free file transfer. **Publisher: Microcom** ***Single User*** **NET0131 $59.** ***Unlimited Users, Apple Talk only*** **NET0132**



$179



FoxBASE+/Mac 2.0

Combines the flexibility of the dBase language, the speed of FoxBase+, and the userfriendly Mac interface. It runs all your dBASE III Plus programs on the Mac, without requiring you to change a single line of source code. In NSTL benchmarks, it outperforms other relational database managers, some by as much as 200 times. Version 2.0 has an improved report writer that creates complex columnar and free-form reports - without programming. Procedure language lets you create custom icons, multiple windows and output screens, and now provides access to up to 16 HyperCard external functions and commands (XFCNs and XCMDs). **Manufactuer: Fox Software** ***FoxBASE+/Mac*** **DAT0047 $289.** ***MultiUser*** **DAT0057**

$419

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❑COM0096 Instant Update-2 user ..... 309.
Pacer Software
❑NET0167 PacerForum ..... 355.
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❑NET0156 StatusMac 2.0 25-user ..... 299.
❑NET0157 StatusMac 2.0 Unlimited ..... 629.
Sitka
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Aldus
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❑DTP0040 Personal Press 1.01 ..... 109.
Quark, Inc.
❑DTP0071 XPress 3.1 ..... 569.
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❑DRI0337 Mac Rescue Video ..... 349.
❑DRI0338 Video Mac Pac ..... 349.
Mass MicroSystems
❑DRI0253 DataPak ..... 649.
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❑DRI0454 DiamondDrive 510 MB Fixed Drive ..... 2599.
Micron Technology
DRI0412 Xceed MacroColor II 24-Bit Video Card 469.
Peripheral Land, Inc.
❑DRI0375 Infinity 88 Removable single ..... 849.
❑DRI0115 Infinity Turbo 40 Meg Removable ..... 699.
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❑DRI0204 60 Meg External Hard Drive ..... 399.
❑DRI0205 80 Meg External Hard Drive ..... 449.
❑DRI0326 100 Meg External Hard Drive ..... 499.
SuperMac
❑DRI0439 Spectrum/24 Series III ..... 1549.
❑DRI0440 Spectrum/8si ..... 549.
❑DRI0442 Spectrum/8 SeriesIII ..... 549.

EDUCATIONAL & ENTERTAINMENT

Amazeinc
❑ENT0400 The Far Side Computer Calendar ..... 45.
Artworx
❑ENT0303 Bridge 6.0 ..... 29.
❑ENT0417 Kaleidokubes ..... 19.
Baseline
❑ENT0403 Talking Moose/ Cartoon Carnival 4.0 .... 23.
Broderbund
❑GRA0268 Kid Pix 1.2 ..... 35.
Where is Carmen Sandiego? ..... ea. 29.
ENT0284 SIMCity ..... 29.
ENT0356 SimEarth 40
EDU0291 The Playroom-Color ..... 29.
Centron Software, Inc.
❑ENT0329 BlackJack Strategy Tester/ BlackJack Ace 65.
❑ENT0384 Canis ..... 27.
❑ENT0277 Casino Master ..... 40.
❑ENT0383 PuzzleMaster ..... 29.
MECC
❑ENT0381 The Oregon Trail ..... 29.
❑EDU0190 Number Munchers ..... 29.
❑EDU0191 Word Munchers ..... 29.
Penton Overseas (Full line available)
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❑VocabuLearn/ce Level I, II or III: French,German, Hebrew, Italian, Japanese, Russian or Spanish ..... ea. 35.
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❑Macintosh; HyperCard, FileMaker Pro, Microsoft Excel, Microsoft Word, Aldus PageMaker 4.0, Aldus FreeHand, Aldus Persuasion, Quark XPress 3.0 ..... ea. 59.
❑EDU0277 Converting to System 7-part 1 ..... 59.
❑EDU0278 Converting to System 7-part 2 ..... 59.
Sir Tech Software, Inc.
ENT0346 Bane of the Cosmic Forge ..... 35.
Sound Source
ENT0418 Star Trek Vol. 1 SPECIAL ..... 29.
ENT0419 Star Trek Vol.2 SPECIAL ..... 29.
Visionary Software
❑BUS0190 First Things First 2.0 ..... 45.
❑EDU0209 Synchronicity 3.0 ..... 45.
Zondervan Publishing House
❑BOK0022 MacBible-Greek ..... 109.
❑BOK0021 MacBible - King James Version ..... 79.
❑BOK0033 MacBible NRS w/Apocrypha ..... 79.
❑BOK0020 MacBible - New International Version ..... 79.

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❑DAC0028 Adobe TypeAlign ..... 62.
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❑FON0295 Adobe Type Reunion ..... 41.
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❑FON0014 Fontographer 3.3 ..... 265.
❑FON0284 Metamorphosis Pro 2.03 ..... 89.
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❑FON0361 FontMonger ..... 62.
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❑FON0439 TypeStyler 2.0 w/ATM ..... 127.

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Abracadata
CAD0032 Design Your Own Home-Architecture ..... 65.
CAD0033 Design Your Own Home-Interiors ..... 65.
CAD0034 Design Your Own Home-Landscapes ..... 65.
Adobe Systems, Inc.
❑GRA0304 Adobe Premiere ..... 309.
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❑GRA0125 Streamline 2.0 ..... 122.
❑GRA0191 PhotoShop 2.0 ..... 549.
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❑GRA0092 Digital Darkroom 2.0 ..... 259.
❑GRA0305 FreeHand 3.1 ..... 395.
❑GRA0131 Super 3D 2.5 ..... 325.
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Claris
❑CAD0029 ClarisCAD 2.0 ..... 645.
❑GRA0271 MacDraw Pro ..... 279.
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Deneba
❑GRA0280 Canvas 3.0 ..... 249.
Dream Maker
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Graphsoft
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Key Tronic
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❑INP0192 TrakPro ..... 219.
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❑INP0084 The UnMouse ..... 159.
Mouse Systems
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Sophisticated Circuits
ACC0535 Power Key w/Quickeys Lite ..... 64.
Wacom
❑INP0179 Digitizing Tablet 6" x 9" ..... 589.

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❑DRI0385 MC73 ..... 159.
UTI0144 Virtual 030 2.0 VM3 ..... 113.
DRI0185 Virtual 2.0 PMMU ..... 188.
DayStar Digital
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❑PowerCache 33 MHz w/882 ..... 979.
❑PowerCache 40 MHz ..... 949.
❑PowerCache 40 MHz w/882 ..... 1199.
❑PowerCache 50 MHz ..... 1459.
❑PowerCache 50 MHz w/882 ..... 1799.
❑DRI0224 FastCache IIci ..... 279.
❑DRI0416 RAM PowerCard ..... 529.
Total Systems
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❑DRI0297 Mercury 16MHz 68030 - SE ..... 365.

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Hayes
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MOD0068 ProModem 2400 Mini Plus ..... 129.

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Abbott Systems, Inc.
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❑UTI0113 CanOpener ..... 62.
Altsys
UTI0224 EPS Exchange ..... 89.
Alysis
❑UTI0232 SuperDisk! 1.7 ..... 49.
ASD Software, Inc.
❑UTI0135 FileGuard 2.7 ..... 139.
❑UTI0130 FileGuard 2.7 - Office Pack 5 ..... 489.
❑UTI0131 FileGuard 2.7 - Office Pack 10 ..... 799.
Baseline Publishing
❑UTI0183 ScreenShot 1.2 ..... 34.
Berkeley System Design
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❑UTI0231 More After Dark/ After Dark 2.0 Bundle ... 45.
CE Software
❑UTI0188 Quickeys 2 v.2.1 ..... 94.
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❑UTI0148 HAND-Off II 2.2.1 ..... 56.
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❑UTI0098 MacPrint 1.3 ..... 95.
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PassProof ..... ea 65.
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❑UTI0191 911 ..... 89.
❑UTI0093 Virex 3.5 ..... 59.
Sallent
❑UTI0254 AutoDoubler ..... 49.
❑UTI0179 DiskDoubler 3.7 ..... 49.
Symantec Corporation
❑UTI0151 Norton Utilities for the Mac 1.1 ..... 85.
❑UTI0214 Symantec Antivirus for Mac 3.0 (SAM) ... 65.
❑UTI0241 Symantec Utilities for Mac 2.1 (SUM) ..... 99.
❑LNG0051 THINK C 5.0 ..... 199.

WORD PROCESSING

Baseline
❑SPL0029 Thunder 7 1.0.4 ..... 56.
Caere
❑UTI0237 OmniPage 3.0 ..... 495.
Calera
❑UTI0215 WordScan ..... 249.
❑UTI0216 WordScan Plus ..... 739.
Claris
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Microsoft
❑WRD0050 Word 5.0 ..... 299.
Sensible Software
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T/Maker Co.
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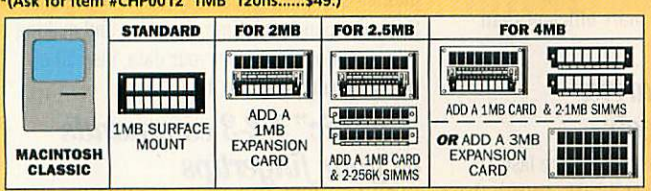
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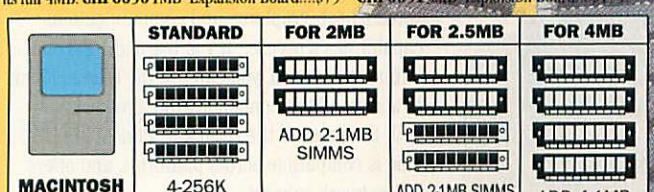
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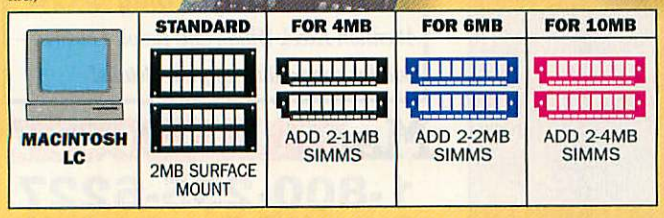
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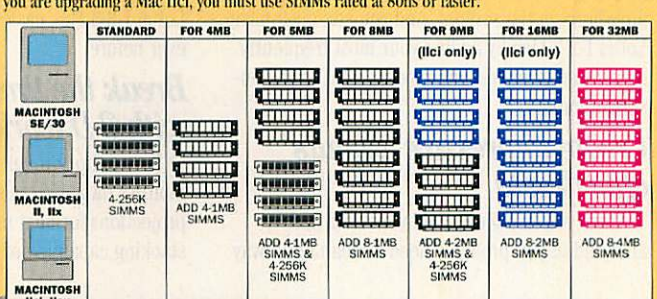
The Mac Classic comes with a standard 1MB of memory, which is surface mounted (soldered) to the motherboard. Additional memory for your Mac Classic is provided by an Expansion Board, which slides into a slot on the Classic's motherboard. The Expansion Board can be purchased with 1MB of memory (for a total of 2MB), and then two 1MB SIMMs can be added to the Expansion Board later, for a total of 4MB. Or, you can install a 3MB Expansion Board, which brings your Mac Classic up to its full 4MB. **CHP0050** 1MB Expansion Board....$79 **CHP0051** 3MB Expansion Board....$179



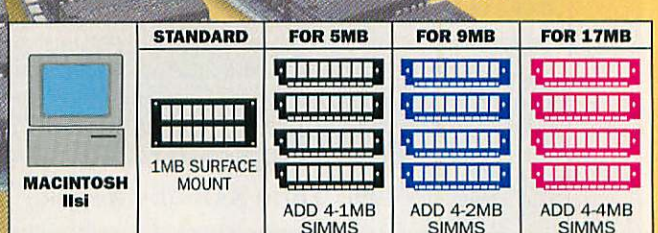
The Mac Plus and Mac SE have four available slots on the motherboard, which originally contain four 256k SIMMs modules — totalling 1 megabyte (1MB) of memory. To upgrade, you can replace each 256k module with a 1MB module, but you must do this in pairs. Replace two 256K modules and you will have a total of 2.5MB of memory. (That's the two new 1MB modules plus the original two 256K modules.) Replace all four modules and you'll have 4MB. (You should save the 256K modules for later use if you want to pass your Mac on to someone else.)



The Mac SE/30, II, IIx, IIcx, and IIci each come with a total of eight slots. The standard configuration has four 256K SIMMs modules, or a total of 1 MB. Here, memory must be upgraded in multiples of four. This allows for expansion from 1MB to 4, 5 or 8MB on the II and IIx, and up to 32MB on the SE/30, IIcx and IIci, depending on whether you are using 1MB, 2MB or 4MB SIMMs. If you are upgrading a Mac IIci, you must use SIMMs rated at 80ns or faster.



The Mac IIsi comes with a standard 1MB of memory, which is surface mounted (soldered) to the motherboard. Four slots are available for additional memory, and you must upgrade your Mac IIsi in multiples of four. The Mac IIsi is expandable to 5, 9 or 17MB, depending on whether you are using 1, 2 or 4MB SIMMs, and the SIMMs modules must be rated at 100ns or faster.



The Mac LC comes with a standard 2MB of memory, surface mounted (soldered) to the motherboard, with two slots available for additional memory. The Mac LC can be upgraded to 4, 6, or 10 MB, depending on whether you are installing 1, 2 or 4MB SIMMs.

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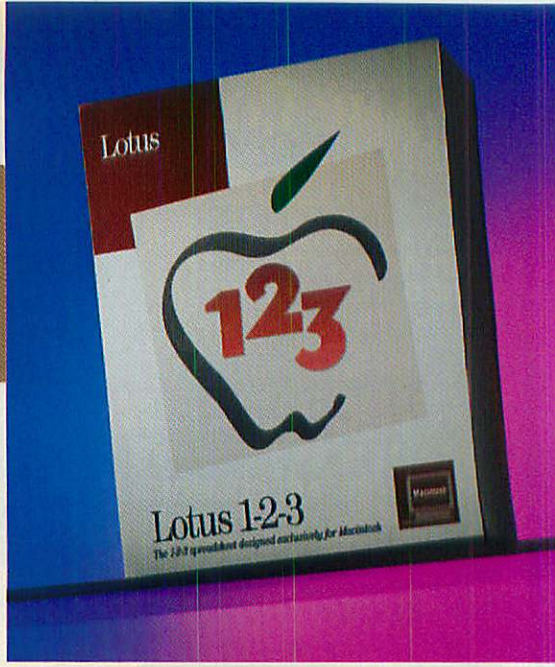
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If you're like most spreadsheet users, it probably takes you a minute to remember that you need to be on the command line when you enter or edit data. With 1-2-3 Mac, that's never a problem. You can click on a cell and make the changes directly and immediately, right within the cell. This easy, natural way to work with data, text, and formulas makes everyday use of Lotus 1-2-3 Mac easier and more efficient than ever before.

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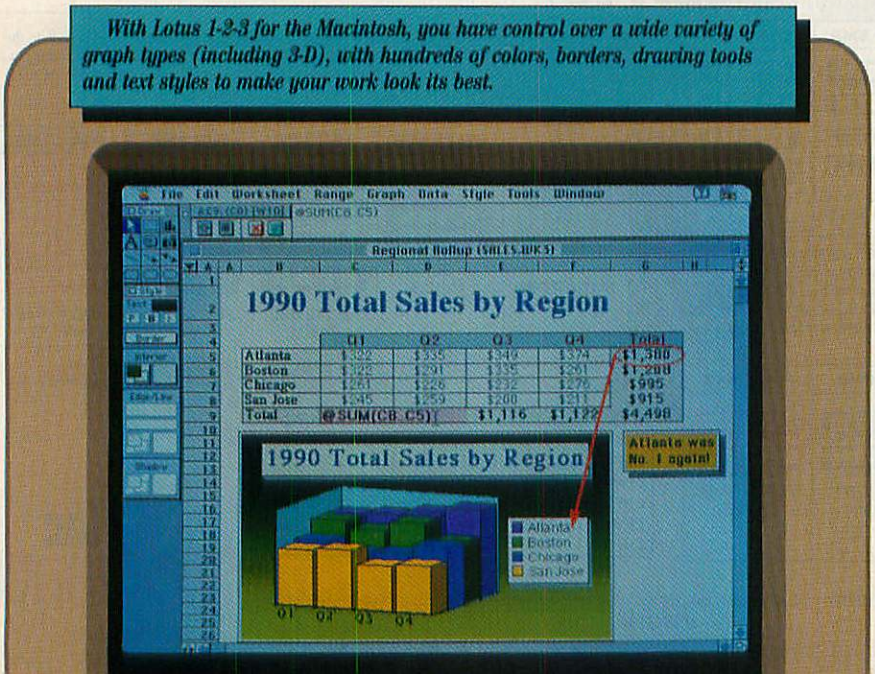
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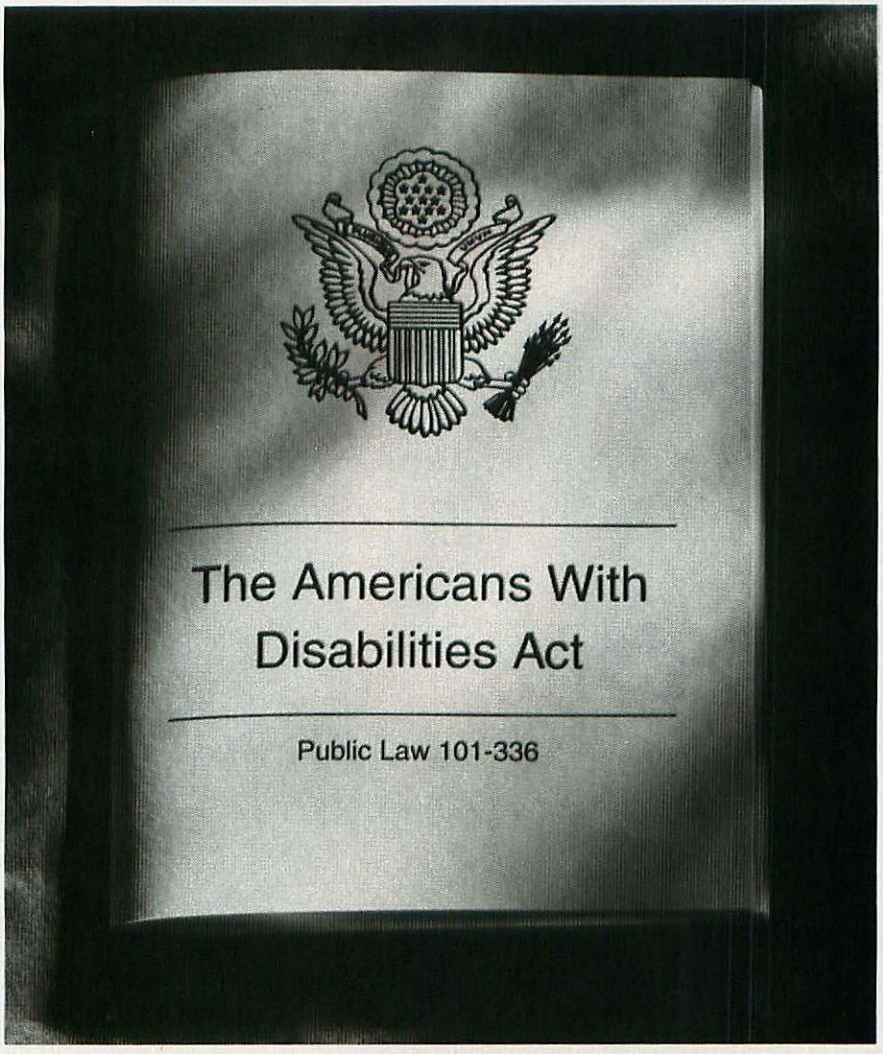
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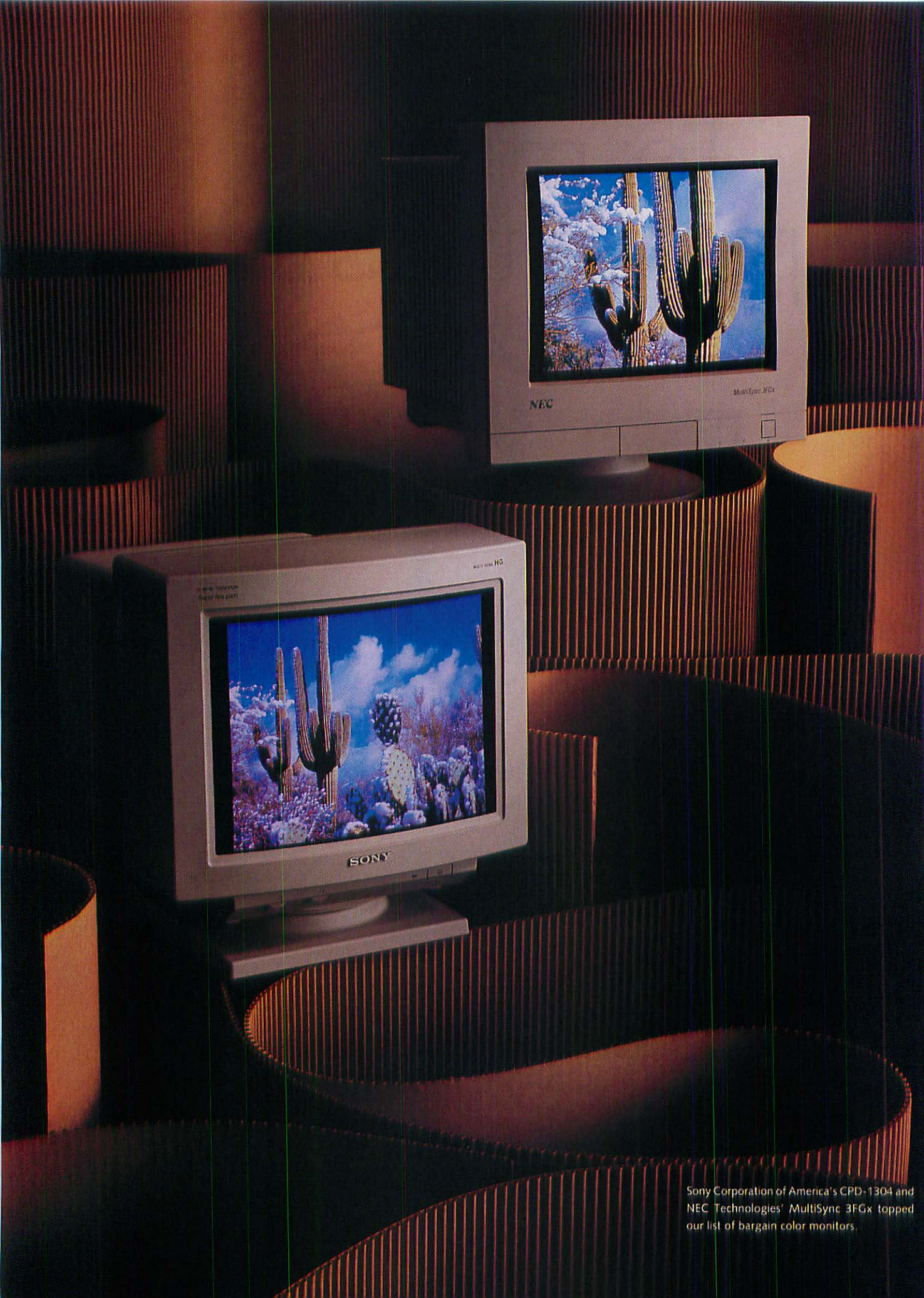


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Sony Corporation of America's CPD-1304 and NEC Technologies' MultiSync 3FGx topped our list of bargain color monitors.

COLOR DISPLAY BARGAINS

by Galen Gruman

Macworld Lab tests six alternatives to Apple's 13-inch color monitor

When you buy a modular Macintosh such as the IIci or LC, chances are you'll also purchase Apple's AppleColor High-Resolution RGB Monitor. The AppleColor is known for its quality, thanks to both the Sony Trinitron tube inside the case and Apple's quality-control procedures. But it's also known for its high price: nearly $1000 list. Several manufacturers offer alternative 13-inch or 14-inch monitors for less money. How much quality would you sacrifice if you bought one of them? Sometimes a little, sometimes none at all, as Macworld Lab tests show.

To help you sort through the alternatives, Macworld Lab tested monitors that work with the built-in video circuitry in the LC, IIci, IIsi, Quadra 700, and Quadra 900—the 13-inch AppleColor High-Resolution RGB Monitor, the 14-inch Magnavox Mac Display 9CM080 from Philips Consumer Electronics, the 13-inch Seiko CM1445 from Seiko Instruments USA, the 14-inch Sony CPD-1304 from Sony Corporation of America, and the 15-inch MultiSync 3FGx and 4FG from NEC Technologies. The circuitry inside the Macs is designed to handle the 640 by 480 resolution common to 13-inch, 14-inch, and 15-inch monitors. (For information on boards for Macs without built-in video circuitry—the Mac II, IIx, IIcx, and IIfx—see "Color Board Choices.") Macintosh SE/30 owners who want to run a color monitor should check out boards from Lapis Technologies and Micron Technology.

We also tested the E-Machines ColorPage E16, which works with the IIci, IIsi, and the Quadra series, but not with the LC. Although this 16-inch monitor runs at 640 by 480 resolution, it is designed primarily to run at 832 by 624. To get that resolution, however, you must purchase and install a special board if you own a Mac II–series computer, or a special cable if you own a Quadra.

Changing Needs

WHY CONSIDER ANY MONITOR OTHER than the AppleColor? Price is a top reason. But so are features like larger screen size and support for multiple resolutions.

Until recently, most low-cost monitors were multisync monitors designed for DOS PCs. Multisync monitors have been popular because they work with all the DOS PCs' video standards. Like a radio that can find and lock onto a radio signal through a search feature, these monitors can lock onto or synchronize with a range of video signals—including those from the DOS PC or the Mac. But these monitors do not plug directly into a Mac's video port, and cable adapters are hard to find.

Many vendors advertise their multisync monitors as Mac II–compatible—but frequently these vendors do not provide a cable adapter (NEC and Sony are among the few companies that do sell the adapter). Increasingly, mail-order firms catering to cost-conscious Macintosh consumers have turned to multisync monitors as low-cost alternatives to traditional Mac monitors, and these companies include adapters. All the monitors we tested can be purchased with the necessary cable. (Usually adapters are made specifically for a certain Macintosh model—before you buy a multisync monitor, make sure the vendor can supply the correct adapter for your Mac.)

In addition to these multisync monitor and cable bundles, a batch of 16-inch monitors has appeared. These monitors can display a full page of text, have higher resolution (832 by 624), and still fit on a desk. They are a good compromise between inexpensive but small 14-inch monitors and full-view but expensive 19-inch monitors.

E-Machines was a pioneer in offering 16-inch monitors—for a long time, it was the only vendor offering them. The downside to these monitors was that they required a costly display board in order to run at the higher resolution. But now that Apple's new Quadras' built-in video circuitry supports the 16-inch monitor's

PHOTOGRAPHS BY ROBIN GINSBERG

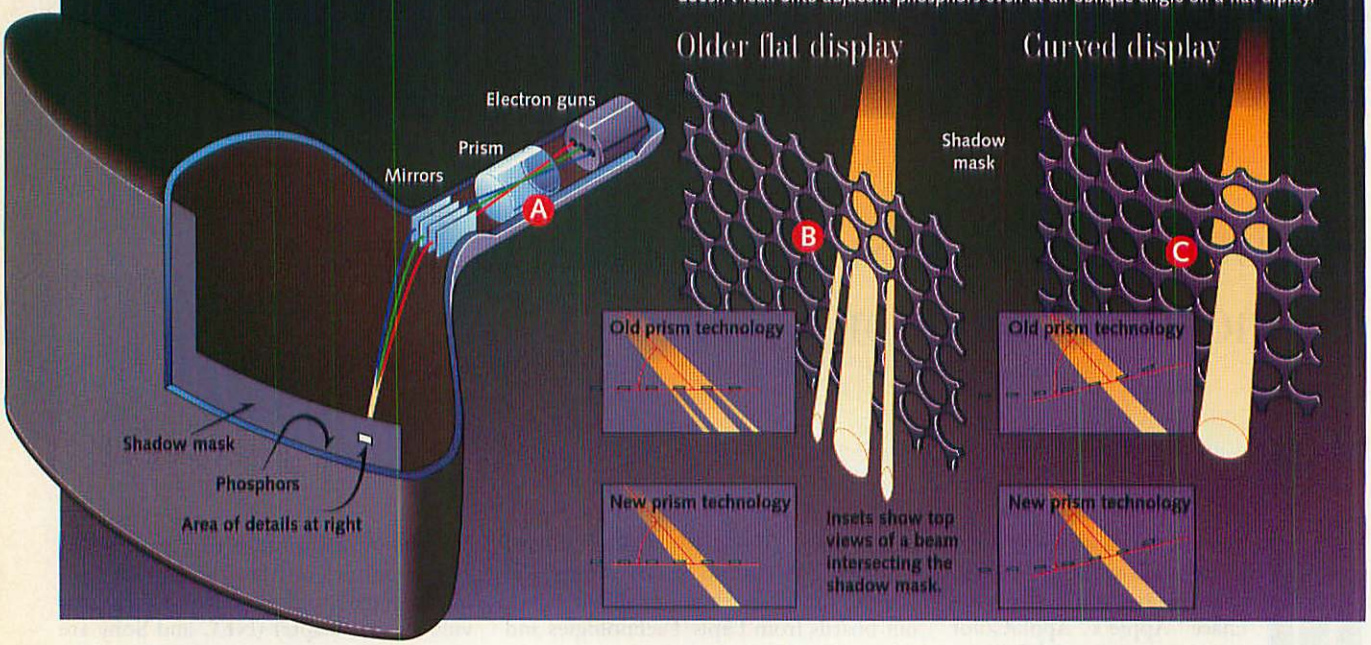
Removing the Barrier to Flat Displays

How a Monitor Works

Three electron guns generate streams of electrons: one each for red, green, and blue. A prism focuses each electron stream into a narrow beam (A). A set of mirrors aligns the beams. A magnetic coil (not shown) forces the beams to sweep across the screen. The beams pass through a shadow mask, which separates three beams and further narrows them, ensuring that they strike the correct phosphors on the screen's glass. A triad of phosphors—one of each color—makes up each pixel on screen.

Making Flat Displays Work Better

Until recently, at the edge of a flat screen—where the electrons intersect the shadow mask at an oblique angle—the beams were wider than a single hole in the mask, causing leakage through adjacent holes and illumination of adjacent phosphors (B). Manufacturers used curved displays to circumvent the problem. Curved edges reduce the beams' spread by keeping the angle at which the beams intersect the shadow mask more perpendicular (C). Advances in prism-manufacturing technology have resulted in prisms that further reduce the amount each beam spreads as it travels to the screen. This narrower beam doesn't leak onto adjacent phosphors even at an oblique angle on a flat diplay.



832 by 624 resolution, a display board is not needed, so a 16-inch monitor is a better bargain. Not surprisingly, Apple is rumored to have a 16-inch monitor in the works.

Almost every multisync monitor (regardless of monitor size) can work at 640 by 480, 832 by 624, and even at 1024 by 768 resolution, depending on the signal it receives from the computer. This is great if you occasionally need to shift to a higher resolution to see, for example, two pages in a layout at once. But a screen image at a higher resolution can be hard to read for long periods of time on a 14-inch monitor, especially if the image contains much text. This is because you are looking at a reduced image—it's like trying to read a detailed two-page chart photocopied in reduction mode to fit on a single 8.5-by-11-inch sheet of paper.

Interpreting the Test Results

IN THE MACWORLD LAB TESTS, THE monitors' quality ranged from acceptable to excellent—none was bad. We evaluated six key areas: convergence, distortion, gray linearity, tracking, brightness, and contrast. The benchmarks in "Color Monitor Tests" show the overall results for five of these areas.

The benchmark results at first may seem to contradict the following findings. The benchmarks show averages of readings across the entire screen; these averages can mask local quality problems. For example, a monitor that performs fairly well across the screen may have a lower benchmark score than one that performs very well in some screen areas and poorly in others.

Convergence checks how well the red, green, and blue beams from a monitor's electron guns line up on the screen. When the beams don't converge, you get a ghosting effect and poor color fidelity. Misconvergence of more than 0.50mm at the corners and more than 0.25mm at the center is noticeable on small monitors. None of the monitors had readings that high, although the Seiko came close in several cases.

The Sony CPD-1304 and Philips Magnavox Mac Display 9CM080 monitors had the best readings (misconvergence of no more than 0.20mm in the corners and no more than 0.10mm in the center). Of the others, the AppleColor had the most readings above those thresholds (3 out of 10). The E-Machines ColorPage E16, NEC MultiSync 3FGx, and Seiko CM1445 exceeded the thresholds in two readings.

Keeping distortion to a minimum is especially important for artists and publishers seeking the closest match between the on-screen display and the printed result. Monitors display objects most accurately (showing a square as a perfect square, not some other kind of rectangle) toward the middle of the screen and least accurately along the corners. Distortion of more than 1/16 of an inch is noticeable.

The Sony CPD-1304 and NEC MultiSync 3FGx had consistently low distortion across the entire screen. The NEC MultiSync 4FG had noticeable distortion across most of the screen, most often along the horizontal axis. The other monitors had pockets of midrange distortion (the AppleColor along the upper- and mid-left and the Seiko CM1445 in the right corners), but none was unacceptable.

Gray linearity measures how accurately a monitor can produce a particular range of gray shades. Often monitors di-

LOW-COST COLOR MONITORS COMPARED

Features	Apple Computer	E-Machines	NEC Technologies	NEC Technologies	Philips Consumer Electronics	Seiko Instruments USA	Sony Corporation of America
Product	AppleColor High-Resolution RGB Monitor	ColorPage E16	MultiSync 3FGx	MultiSync 4FG	Magnavox Mac Display 9CM080	Seiko CM1445	Sony CPD-1304
Price	$999	$1595	$749	$899	$599	$899	$995.95
Screen diameter (in inches)	13	16	15	15	14	14	14
Active screen area (in inches)	9.3 x 6.8	11.6 x 8.7	10.2 x 7.7*	10.2 x 7.7*	9.2 x 7.4	9.4 x 7.1	9.2 x 7.1
Maximum resolution (w x h, in pixels)	640 x 480	1024 x 768	1024 x 768	1024 x 768	640 x 480	640 x 480	1024 x 768
Pixel density at 640 x 480 (in dpi)	69	55	58	58	68	72	68
Type of picture tube	S	T	H, N	H, N	P	S	S
Color-calibration controls	○	○	○	●	○	○	○
Can adjust pincushioning	○	○	●	●	○	○	○
Can adjust image width	○	●	●	●	●	●	●
Cable adapter required	○	○	$19.95	$19.95	○	○	$19.95

● = yes; ○= no. H = Hitachi flat, square tridot; N = NEC flat, square tridot; P = Philips tridot; S = Sony Trinitron; T = Toshiba flat, square tridot.

*Can be extended to 8.2 x 11 with FullScan feature.

verge from the percentage level you specify in software—particularly for less intense shades. For example, a monitor with poor linearity may display 10 percent gray as 6 percent gray. The more divergence, the less evenly a monitor displays the full range of gray levels and the less likely it is that the gray seen on the screen will match the gray specified.

The Philips Magnavox 9CM080 consistently outperformed the others, showing variance of more than 5 percent only twice in the 36 test levels. The other monitors were off by more than 5 percent for more than half the tests.

The measurements for gray linearity also provide information on tracking—that is, how balanced the monitor's red, green, and blue guns are in relation to each other at the same luminance (level of light emissions). For example, if at 60 percent gray, the three guns emitted 70 percent of their respective colors, the gray level would be off (70 percent rather than 60 percent), but tracking would be ideal, since all three would be at the same value. In reality, the guns vary, so at 60 percent gray, the green gun may be at 65 percent, the red at 59 percent, and the blue at 61 percent. A 5 percent spread among the three is enough for a change in color cast to be noticeable; a spread of more than 10 percent makes the color change obvious.

None of the monitors had poor tracking. In fact, all but the Sony CPD-1304 had values consistently below 5 percent variance, and the CPD-1304 surpassed that figure only once in 12 test values. Still, there were some differences. The NEC MultiSync 4FG had the best tracking, while the AppleColor had the worst, with divergence surpassing 2.5 percent in the 5 readings taken from 50 percent to 80 percent. That means the AppleColor's color fidelity is the poorest in midlevel to bright colors, which are commonly used. The Sony CPD-1304 had similar problems, being off by similar percentages in four readings in the same range of luminance. Still, the amount of divergence was not high and would not be noticed by most users.

Contrast measures the difference between the darkest gray (black) and lightest gray (white). A ratio greater than 8:1 (white is 8 times brighter than black) is excellent, while a ratio above 6:1 is good.

The NEC MultiSync 3FGx had the worst measurements, with a ratio of less than 6:1 for most screen areas. The Sony CPD-1304 had the best readings, with a ratio of better than 8:1 in 3 of the 5 areas tested; overall, it was just under 8:1. The AppleColor and the Philips Magnavox 9CM080 also had high ratios, although they had better contrast at the bottom of the screen than at the middle or top.

Look and Feel

BUYING A MONITOR IS AS MUCH A SUBjective decision as a data-based one. In subjective assessments, *Macworld* editors placed the Sony CPD-1304 at the top and the Seiko CM1445 at the bottom when considering issues like color, brightness, reflection, and controls. The CM1445 performed adequately in terms of color depth and range, but it lacked contrast and appeared dim. Only when we set the brightness high and the contrast low was the CM1445 acceptable overall.

We disagreed about the other monitors. Some thought the AppleColor, the NEC MultiSync 3FGx, and the NEC MultiSync 4FG tied with the Sony CPD-1304 for best overall display, while others thought the AppleColor, NEC 3FGx, and NEC 4FG were good but clearly tied for second place. We all thought the



The Apple AppleColor High-Resolution RGB Monitor offers strong quality features, and the latest model has been reengineered to sharply cut ELF radiation emissions.

E-Machines ColorPage E16 and Philips Magnavox 9CM080 were adequate.

We found that the Sony CPD-1304 and the AppleColor had the best color depth and range. The E-Machines ColorPage E16's colors looked translucent, not rich—even at the higher 832 by 624 resolution it was designed for. Some of us liked the NEC 3FGx and 4FG's colors, but others thought them a bit bland, mostly because of their lower contrast. The more important contrast is to your personal taste, the less you'll like the NEC 3FGx and 4FG.

We agreed that the AppleColor had the sharpest image display, but most of the others were close behind. The exception was the E-Machines ColorPage E16—its 16-inch screen diameter results in oversize pixels at a resolution of 640 by 480. Even at 832 by 624 resolution, the ColorPage E16 display was noticeably less sharp than the others at 640 by 480 resolution.

Monitors like the NEC 3FGx and 4FG are touted as being better because of their flat, square tubes, which make the screen less curved than does a typical

cathode-ray tube. But we did not see a major advantage to a flatter display.

A more important concern, however, was the screen's reflectivity. Most of the monitors reflect light easily, acting as a distracting mirror. The Sony CPD-1304's glass was by far the best in preventing annoying glare; the E-Machines ColorPage E16 also did well. The Seiko CM1445 was clearly the worst, acting as a reflector in which we could watch people pass by. The other monitors also had noticeable reflection.

Ergonomics Considerations

EVERY MONITOR BUT THE APPLEColor includes a tilt-and-swivel stand, which is important because it lets you orient the monitor to the height and angle of your vision. For the AppleColor you must buy a separate base (the Apple Universal Monitor Stand), which costs $89.

Physical controls are also important because different types of images benefit from changes in brightness, contrast, or centering. And in an office where people share a monitor or where lighting conditions change (perhaps you are lucky enough to have natural light), the need to adjust the display is obvious. All of the monitors we tested have brightness and contrast controls located on the outside of the case, and all but the AppleColor have controls for adjusting the horizontal and vertical centering of the image.

NEC includes color calibration in the 4FG. You can adjust the amount of red, blue, and green the monitor displays via a set of buttons on the front panel. Theoretically, you can make the screen more accurately match a printout. But color calibration is far from an exact science for any monitor, scanner, or printer manufacturer—don't count on the 4FG's calibration to solve your proofing woes. But color calibration is useful if you want a group of monitors to display the same color characteristics.

Most of the monitors' casings were sturdy, and the cables or cable adapters fit into the Mac's video port. But there were two notable exceptions: the casing on the NEC 3FGx and 4FG felt flimsy—indeed, the 3FGx's control-panel covering broke during routine handling—and the plug on the Magnavox 9CM080 would not fit directly into a Mac LC, IIci, or IIsi. Philips has announced a new cable for the Magnavox 9CM080 to fix this problem.

ELF Emissions

INCREASING CONCERN OVER EXtremely-low-frequency (ELF) magnetic emissions from monitors has led several companies, including NEC, to advertise claims of low emission levels for their

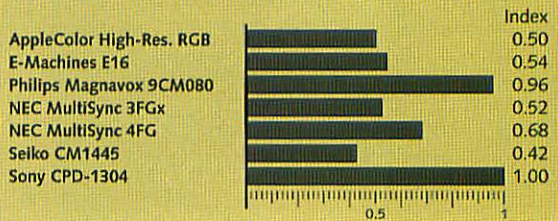
MW LAB Color Monitor Tests

Longer bars are better.

Convergence

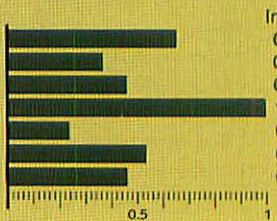
The best monitors in each test set received an index rating of 1.00. All other monitors in that set were ranked relative to the best one. (An index rating is like a percentage: 1.00 is like 100%, 0.80 is like 80%.)

Convergence denotes how closely the red, green, and blue electron guns hit on the same spot on screen. The better its convergence, the more accurately a monitor renders color. The Sony's average convergence was best (0.17mm); the Magnavox's was a close second (0.18mm). The Seiko's was worst, at 0.41mm.



Distortion

A monitor's level of distortion determines how geometrically correct an object appears on screen—a square should appear as a perfect square, not some other kind of rectangle. We measured distortion in units of 1/64 inch. The NEC 3FGx had the least distortion, while the NEC 4FG had the worst, at four times the 3FGx's level.



Color Board Choices

Macworld Lab tested 10 boards that let you run a small color monitor from a Mac II or IIcx. The primary difference among the boards is speed (see "Color Board Speed Tests"). The three slowest boards performed at about 80 percent of the speed of the fastest (the E-Machines Futura EX and Radius PrecisionColor 8x). For example, scrolling a Microsoft Excel document took almost 45 seconds with the ColorCard/24, while the PrecisionColor/GX took 28 seconds.

But these differences were minor compared to the difference between the boards as a group and the speed of a monitor that uses a Mac's built-in video circuitry. The LC's built-in video performed at 50 percent of the speed of the fastest boards (the E-Machines Futura EX and Radius PrecisionColor 8x) in our tests. For example, scrolling the same Excel document took the LC's built-in video about 60 seconds versus 28 seconds for the fastest boards. The IIsi's internal video was not much better: it performed at 60 percent of the speed of the top boards.

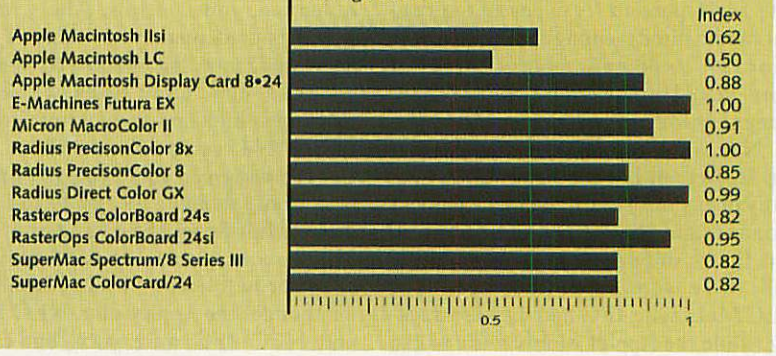
Prices for the boards range from $569 (Micron's MacroColor II) to $999 (RasterOps' Colorboard 24si). The differences in price are due largely to differences in the boards' capabilities. Most of the boards support a range of resolutions and screen sizes; some include QuickDraw accelerators and 24-bit color. So what appears to be an expensive board to run a 14-inch color monitor may actually be a bargain to run a 19-inch monitor.

If you seek only to run a 14-inch color monitor, you should consider price as well as speed. The MacroColor II is the best buy—it is reasonably fast (falling right between the slowest and fastest boards), includes 24-bit color, and at $569, is inexpensive.

MW LAB Color Board Speed Tests

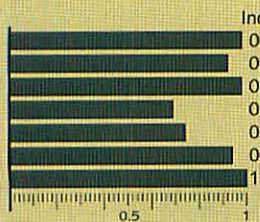
Longer bars are better.

Speed reflects the average time it took to perform seven sets of scroll tests and one set of zoom tests (in PageMaker).



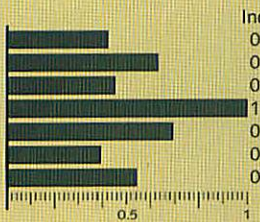
Contrast

The better a monitor's contrast, the better you can see details in light or dark areas of an image. We calculated the ratio between white and black squares. The Sony came in best at 7.9:1; the Magnavox and AppleColor were close seconds at 7.7:1. The NEC 3FGx was the poorest, at 5.4:1.



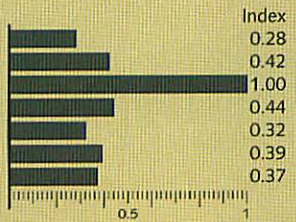
Brightness

Most people prefer a brighter monitor. We turned the screen's brightness up as high as it could go without showing scan lines. The NEC 3FGx was the brightest: at 77.7 footlamberts it was 2.6 times as bright as the least bright monitor, the Seiko, which measured at 30.4 footlamberts.



Gray Linearity

Gray linearity shows how well the monitor displays shades of gray. The ideal monitor will produce, say, 60 percent gray if the user specifies 60 percent gray for an image. The Magnavox's range of grays most closely matched the specified range, while the AppleColor's was the farthest away.



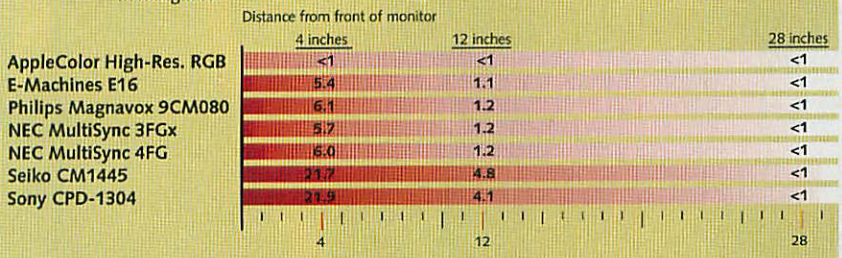
MW EDITORS' CHOICE

Sony CPD-1304 Hands down, this is the best monitor in terms of display quality. It's among the most expensive, but its quality is easily worth the extra money. **Company:** Sony Corporation of America. **List price:** $1019.90 (including required adapter).

NEC MultiSync 3FGx In terms of flexibility, this is the best bargain. It offers solid image quality, sufficient controls, a large screen, and a moderate price. **Company:** NEC Technologies. **List price:** $768.95 (including required adapter).

MW LAB ELF Emissions

In milligauss.



We tested extremely-low-frequency (ELF) emissions at 4 inches, 12 inches, and 28 inches from the front of each monitor. The bars show the change in emission levels as you get farther away from the monitor; the more intense the color, the more intense the emissions. Measurements of less than 1 milligauss (mG) are too weak compared to normal background radiation levels to be significant—all of the monitors tested emit less than 1mG of ELF radiation at a distance of 28 inches. Instrument accuracy is ±0.2mG.

We tested ELF emissions with a Combinova meter from Ergonomics, Inc., of Southampton, Pennsylvania. We used a Holaday Industries meter for the AppleColor monitor.

monitors. While there are no definitive standards on what level of ELF emission is bad—or even a consensus on whether low levels of ELF emissions *are* bad—there is enough data to suggest caution.

People concerned about possible risk should note that, for all the monitors tested, emission levels from the front and left side were lowest, while emission levels from the back and right side were at least twice as high. From an arm's length away (28 inches), none of the monitors produced any more ELF emissions than the ambient ELF emissions produced by the lighting and wiring in a typical office.

If you are concerned about ELF emissions, keep toward the front and left sides of your monitor and work an arm's length away. An arm's length may seem to be too far away to sit, but it really isn't. At *Macworld*, we measured how far away our editors and artists sit from their monitors. Of the 30 people we checked, six sat 28 inches away or farther, and 18 sat between 20 and 27 inches away. The closest anyone sat was 15 inches.

One of the most dramatic responses to users' concerns about ELF emissions has come from Apple, which reengineered its AppleColor monitor to slash emissions to very low levels. Readings taken 4 inches from the front of the new AppleColor monitor are less than 2 percent of the readings from a year-old model—a 98 percent reduction in emissions. From other directions, the reductions are less but still dramatic—at least a 75 percent reduction.

The AppleColor shows that Trinitron-based monitors (which include the Sony and Seiko monitors here) do not have to be high emitters of ELF radiation. The tridot monitors—those from E-Machines, NEC, and Philips—generally did better than the AppleColor in emissions from other directions, but the differences were typically small. For example, at 12 inches away from the back, the tridot monitors had emissions between 1.7 and 2.2 milligauss, compared to 2.8 milligauss for the new AppleColor.

Apple also significantly improved emissions from the back, which is important in offices where small cubicles are arranged so workers are close to the back of their neighbor's monitor. At 12 inches away, the back of the AppleColor was 80 percent less emissive as the back of the next highest monitor, and 96 percent less emissive than the old AppleColor model.

Choosing a Monitor

WHEN CHOOSING A MONITOR, KEEP price in perspective: $100 or so is a worthwhile investment for a noticeably better display, since you'll be looking at it daily for years. Also keep in mind that if you buy a monitor directly from a vendor or via a mail-order firm, you'll pay less than list prices suggest.

Because of vagaries among suppliers, the monitors available from direct sellers and mail-order firms can change at any time. *Macworld*'s *Conspicuous Consumer* column is a good source of advice on buying by mail.

Except for E-Machines' ColorPage E16, none of the monitors are a bad deal for use with a Macintosh's built-in video circuitry. The ColorPage E16's price is high for use at 640 by 480 resolution, and its quality is merely adequate. If you plan to use the monitor at its higher 832 by 624 resolution, you'll find its quality is better and its price is competitive with other monitors of its size and resolution.

And although the AppleColor wasn't our top choice, it is a fine monitor, and you may be able to get it at a good bargain as part of a complete system. ■

See *Where to Buy* for contact information.

Macworld Lab testing supervised by Danny Lee.

MADE IN JAPAN
ft
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MACRO
SUPERIMPOSE
COLOR
MEM

Frame by Frame

Video capture on the Mac is smoother than ever with these products

BY TOM NEGRINO

AT THEIR BEST, PERSONAL COMPUTERS are communication machines: they help you get your point across better. The Mac's superb graphics tools set new—and higher—standards of illustration and artwork for educational materials, publications, and business presentations. But sometimes the best illustration is a snapshot taken from the real world. And for getting the world's images into the Mac, video capture is made to order. For applications that require the highest-quality images, such as glossy-magazine publishing, high-resolution scans of flat photographs are still the best solution. But video capture offers flexibility that you don't get when scanning a photograph. There's no need to develop and print film before scanning; you can shoot video and immediately digitize it, saving time and money. And video capture lets you grab and build a sequence of frames for animation.

One Frame at a Time

You can use a captured video image in many of the places that you might use an illustration. Digitized images can be saved as PICT or TIFF files, then placed into newsletters or other desktop publications. You can print captured video frames on a LaserWriter and use them as handouts during a presentation. In creating storyboards for proposed new television commercials, ad agencies can reuse frames taken from TV spots. Video images can even be converted to halftones in Photoshop and then used in print advertising. You can paste a captured image into a HyperCard stack, then overlay the image with a button; clicking on the button zooms you to more information about the image. Most database programs now have picture fields, which means you can paste video frames saved as PICT files into a database record. This lets you have, for example, a parts-inventory database with a picture of each type of widget, or a transcript file with a digitized mug shot of each student.

For people who use 3-D modeling programs, frame grabbing provides quick access to a huge array of images that can be used as 3-D texture maps. Architects and artists can use video-based images for reference or as building blocks for new art.

Not all uses of captured video are so obvious. For example, Duayne Dillon, a criminologist, uses a Mass Microsystems video-capture board to provide evidence to courts in civil and criminal cases. Dillon's captured images help show when documents and signatures are forged or altered.

QuickTime Possibilities

APPLE'S SOON-TO-BE-RELEASED QUICKTime system software will let synchronized video images and sound be used in almost any application (for more information on QuickTime, see "QuickTime in Motion," *Macworld*, September 1991; and "QuickTime Tools," February 1992).

QuickTime lets you put full-motion video on the Mac—movies with 30 frames per second, 24 bits of color, and 640-by-

ELISABET ZEILON

480-pixel frame size—but as yet there is no video-capture board that can handle that much data. Given the reality of most QuickTime movies, which have slower frame speeds, lower bit depths, and frame sizes of 160 by 120 (that's only 1/16 of a full-screen image), it's feasible but arduous to capture individual images and edit them into a QuickTime movie.

What It Takes

REGARDLESS OF WHETHER YOU WANT to capture a series of frames for QuickTime movies or individual images for use in publishing or databases, you need many computer resources because each video frame contains much information.

First you need a Mac II–class machine with at least 4MB of RAM; 8MB or more is much better. You need real, physical RAM—the disk-based virtual memory available in System 7 just isn't fast enough for video-capture purposes because hard drives aren't fast enough.

A 24-bit, 640-by-480-pixel captured video frame can take up more than 1MB, so a large, fast hard drive is a must. Most people need a 300MB hard drive with an access time of 15ms or better.

A video image requires only 16 bits of color, but 16-bit video display boards are not available, so you need to turn to a 24-bit display board. You can save a little money by buying a RasterOps or SuperMac board that combines 24-bit display and video-capture functions.

Once you've captured your images, you'll want to do something with those frames. For that you need software.

If you're grabbing single frames for presentations, you'll likely have to clean up the video, so Adobe Photoshop or Letraset ColorStudio will come in handy. Especially useful for cleanup are the new De-Interlace and Median filters in Photoshop 2.0, which smooth frames by removing the even or odd scan lines; De-Interlace replaces the discarded lines with copies of the remaining lines, and Median replaces them by adding new lines interpolated from the remaining lines (see "Understanding Video").

Once the frames are spruced up, the actual presentation requires MacroMind Director, Microsoft PowerPoint, or a similar presentation program.

Budding QuickTime movie producers will want the QuickTime software and probably an editing tool, like Adobe Premiere (formerly SuperMac's ReelTime) or DiVA's VideoShop.

What's Right for You?

YOU SHOULD CHOOSE A VIDEO BOARD based on what kind of video-capture source you expect to use and what quality of captured image will satisfy you. All boards are not created equal; some perform best with a camera as the video input, some do better with signals from a paused videotape recorder, and others provide capture for a low price by sacrificing picture quality.

Most video-capture devices come in the form of NuBus expansion boards for the Mac II series. An exception is Koala's MacVision Color Video Digitizer, a box that attaches to the SCSI port, letting Macs without NuBus slots digitize video.

Unfortunately, the MacVision Color didn't fare well in my evaluation. Because the SCSI bus is inherently slower than a NuBus bus, the Koala unit makes three passes to capture a video frame, one pass each for the red, green, and blue components of the signal. This approach, called *video digitizing*, takes several seconds to capture one full-color frame and is useless for capturing motion video, since the three components are out of sync.

To get a usable image from the MacVision Color, you have to use a paused videotape player or an unmoving feed from a video camera. And even for still video, the MacVision Color lacks resolution, blurring the frame and adding artifacts (color speckles) to the image.

I recommend the MacVision Color only for owners of slotless Macs, like the Plus or Classic. You can still capture color frames and take the files and manipulate them on a Mac that has color.

The other video digitizer I tested was Digital Vision's ComputerEyes/Pro Color Video Digitizer. This NuBus board also takes several seconds to scan a frame and requires an absolutely stable image, from a camera or a paused laser disc player, to get acceptable capture results. It doesn't do well with a paused VCR as the input, because of the VCR's weak synchronization signal. On the plus side, ComputerEyes/Pro is the least expensive of all the boards I tested that support

Understanding Video

To understand video capture, it helps to know a little about the underlying technology.

There are three world standards for color video signals. There's the *NTSC* standard in the United States and Japan, *PAL* in most of Europe, and *SECAM* in France and Eastern Europe.

A television picture is drawn onto the picture tube by one or more electron guns, which fire a stream of electrons at the face of the tube one horizontal line (called a *scan line*) at a time. The electron gun draws all the even lines first, then goes back to the top of the screen and draws the odd lines. This process is known as *interlaced video.*

There are 525 scan lines in one NTSC video picture, or *frame*. Each half of the frame (the even lines or the odd lines) is called a *field*. Like motion pictures, to provide the illusion of movement, TV signals produce a rapidly presented succession of individual frames (there are 30 frames per second).

Frame grabbers accept video inputs in one of two formats: *composite video* and *component video.* Most video-capture boards now have both composite and component inputs.

Composite video mixes the red, green, and blue part of the signal (called the *chrominance* information) with the black-and-white part (the *luminance* information).

Component video (usually called *S-Video* in consumer equipment) keeps the two parts of the signal separate and usually provides better color quality and resolution than composite video does.

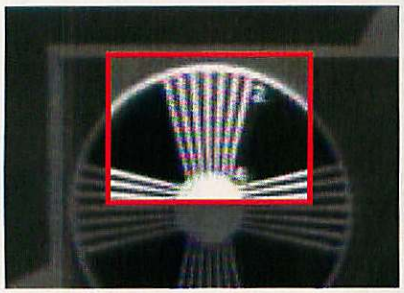
Another part of the video signal is called *sync.* This timing pulse is the heartbeat of the video signal, maintaining the picture's stability. Many consumer VCRs put out a weak sync signal, especially in paused mode, which makes it difficult for frame grabbers to lock onto the sync signal. This results in poor captures. If you expect to be grabbing frames from paused videotape, test the capture board with your VCR before you buy.

Although the NTSC standard is 525 scan lines per frame, that resolution is only achieved by professional broadcast equipment. The highest-quality consumer video equipment is the laser disc, which puts out between 425 and 450 lines of resolution. Super VHS VCRs can achieve 400 lines, while a regular VHS recording limps along at 240 lines. Consumer video cameras vary widely in resolution, but most have 300 to 350 lines.

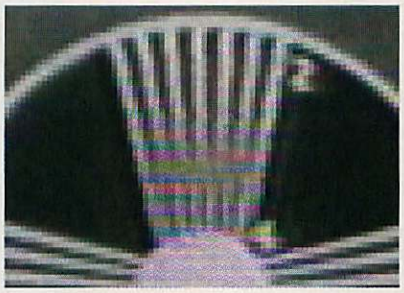
To help decrease the amount of hardware resources required for video capture, much work is being spent on compression algorithms. The best known is the still-evolving *JPEG* effort, named for the Joint Photography Expert Group formulating it. Several companies are hard at work developing hardware compression add-ons for their boards using the JPEG standard and compression chips from C-Cubed Microsystems.

Video-Capture Comparison

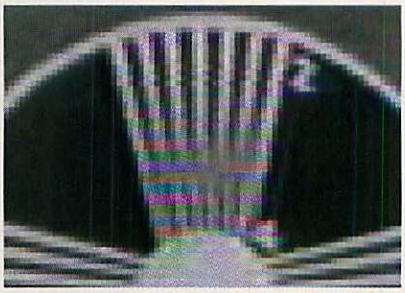
The fine lines, circles, diagonal lines, and gray levels of a TV test pattern clearly differentiate capture quality.



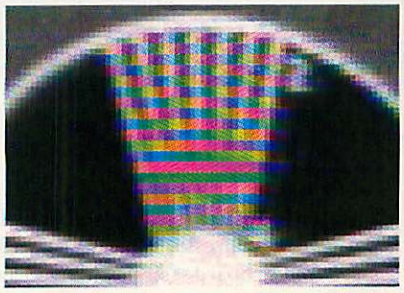
Overall Best The Computer Friends ColorSnap 32+ did the best in faithfully capturing the test image, shown here at actual size (the other samples are shown at twice actual size). The RasterOps Video ColorBoard 364 was a close second.



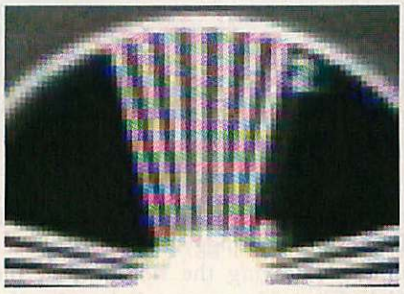
The RasterOps 24STV captured an acceptable range of contrast, although blacks tended to be washed out or splotchy. There was minimal ghosting and, as with most boards, some color banding on vertical lines.



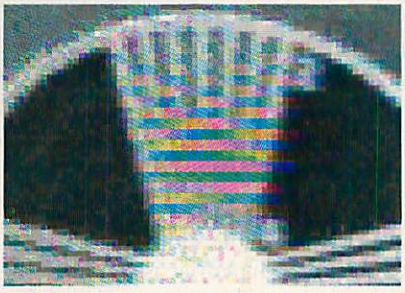
The RasterOps 24XLTV performed similarly to the 24STV. Images had acceptable contrast but a tendency for blacks to be washed out or splotchy. There was minimal ghosting and some color banding on vertical lines.



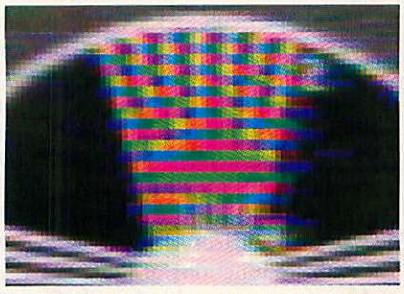
The RasterOps Video ColorBoard 364 had the best contrast, capturing deep blacks and bright whites faithfully. There were some subtle color splotches in dark solid colors, as well as noticeable color banding on vertical lines.



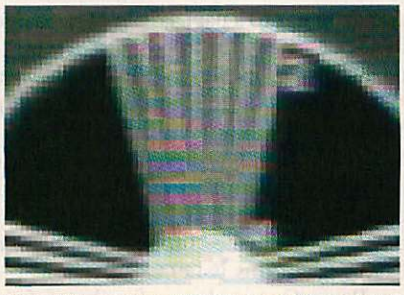
The Computer Friends ColorSnap 32+ captured blacks very solidly, although there is noticeable color smearing and ghosting to the right of objects, especially along curves. The numerals were also fuzzy.



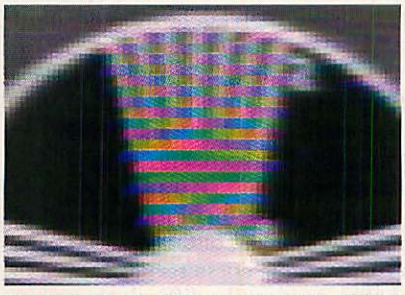
Digital Vision's ComputerEyes/Pro captured the fuzziest images, with the least contrast. There are noticeable artifacts in gray areas, as well as some color banding in diagonal lines.



Koala's MacVision Color video digitizer had the most noticeable color banding and artifacts on the vertical lines. It also had noticeable color smearing and splotches throughout the image, as well as horizontal ghosting.



Mass Microsystems' QuickImage 24 produced good gray tones overall. The color banding on vertical lines was minimal, although the lines were fuzzy and had little detail between them compared with the other boards' captures.



The Truevision NuVista+ performed similarly to the RasterOps Video ColorBoard 364, except for being a little fuzzier overall. It did well retaining deep colors and minimizing ghosting.

S-Video, so if you can live with its limitations, it's a bargain.

The MacVision Color and ComputerEyes/Pro are well suited for people who need frames of unmoving objects for use in HyperCard or a newsletter.

The other devices, all PDS (Processor Direct Slot) or NuBus boards, are *frame grabbers*, which capture an individual frame of video in 1/30 of a second (the rate at which frames are transmitted on TV). This rate is fast enough to fool the eye into seeing smooth motion rather than a series of discrete images.

There are several frame grabbers in the under-$1000 range that are good for capturing frames that will end up in databases, storyboards, handouts, and publications.

With its relatively low-cost ($499) VideoSpigot frame-grabber boards for the Mac LC and IIsi, SuperMac Technology aims to broaden the video-capture market. These boards were not shipping in time for my evaluation, so I could not test them. From demonstrations of prototypes, I saw that the VideoSpigot boards don't provide live video preview windows; instead, they update the screen every few seconds.

VIDEO CAPTURE COMPARED

Company	Product	List Price	24-bit Color	Combined Capture and Display Board	Supported Display Size (in inches)	Video Inputs	Plug-In Modules	Expansion
Computer Friends	ColorSnap 32+	$995.00	●	○	all	NT, SV	PS, QX	C
Data Translation	QuickCapture	$1295.00	○	○	all	NT	○	○
Digital Vision	ComputerEyes B/W	$249.95	○	○	all	NT, PA	○	○
	ComputerEyes/Pro	$399.95	●	○	all	NT, SV [1]	PS	○
Dycam	Model 1	$995.00	○	○	all	NA	○	○ [2]
E-Machines	QuickView Studio	$1995.00	●	○	all	NT, PA, RGB, SV	○	S
Koala Acquisitions	MacVision Grayscale Video Digitizer	$399.00	○	○	all	NT, PA	DD, PS	○
Koala Acquisitions	MacVision Color Video Digitizer	$799.00	●	○	all	NT, SV	DD, MV, PS	○
Mass Microsystems	QuickImage 24	$695.00	●	○	all	NT, PA, SV, TV	PS	○
Radius	RadiusTV	$1699.00	●	○	all	NT, PA, RGB, TV	○	○
RasterOps Corporation	24STV	$1799.00	●	●	13	NT, PA, SE, SV	PS	A, C, T
	24XLTV	$3999.00	●	●	13, 16, 19, 21	NT, PA, SE, SV	PS	C, T
	Video ColorBoard 364	$1099.00	●	●	13	NT, PA, SV	PS	T
	MediaTime	$2799.00	●	●	13	NT, PA, SE, SV	PS	A, C, S [2], T
Scion Corporation	Video Image 1000	$895.00	●	○	all	NT, PA, SV	○	○
	Video Image 1200	$1095.00	●	○	all	NT, PA, SV	○	S
	Video Image 1500	$1395.00	●	○	all	NT, SV	○	○
	Video Image 2000	$1795.00	●	○	all	NT, SV	○	S
Truevision	NuVista+	$3595.00	●	●	all	NT, PA, RGB, SV, TV	CS, PS	R

● = yes; ○ = no, none. A = video accelerator; C = compression; CS = ColorStudio; DD = Digital Darkroom; MV = Koala MacVision; NA = not applicable; NT = NTSC; PA = PAL; PS = Photoshop; QX = QuarkXPress; R = RAM; RGB = RGB signal required; S = sound digitizer; SE = SECAM; SV = S-Video; T = TV tuner; TV = television.

[1] Built into board. [2] Separate PAL version available.

The VideoSpigot Pro adds a 24-bit display adapter to the VideoSpigot's capture functions. SuperMac is counting on its proprietary video-compression software to help the VideoSpigot stand out; when used with QuickTime, the VideoSpigot promises to allow higher frame rates, for larger frames, than does Apple's standard software compressor, which the VideoSpigot board is designed to replace.

Mass Microsystems' QuickImage 24 is a good unit, and it's bundled with a limited version of Photoshop. But the QuickImage 24 software's unique interface requires some patience. It uses nonstandard buttons and other innovations that slow your understanding of the program. The preview window doesn't show frames in real time, so it can be difficult to get just the right image. Still, after you get used to the QuickImage 24's quirks, you can get fairly good results.

For example, George Forman, an education professor at the University of Massachusetts–Amherst who teaches karate to children in his spare time, videotapes himself doing the many fighting forms, called *kata*, properly. To help his young students learn the *kata*, he used the QuickImage 24 to capture key frames from the videotapes to produce a LaserWriter-printed manual with plenty of blank space for students' notes.

Computer Friends makes the ColorSnap 32+, a one-slot capture board that is actually a large NuBus board with a smaller piggyback board attached. Because of this piggyback board, I recommend leaving the slot next to the ColorSnap 32+ empty. Otherwise the piggyback board could touch the board in the next slot and cause electrical interference. The ColorSnap 32+ comes with a plug-in module for Photoshop and QuarkXPress, so you can grab a frame and drop it into a page layout. This could be especially useful in creating for-position-only mock-ups of a finished layout.

In my experiments, the ColorSnap 32+ made clean captures. And the ColorSnap capture application lets you use one of three levels of software-based JPEG compression to crunch file sizes by as much as 100:1 (see "Image Compression Matures," in this issue).

RasterOps makes a family of four boards with impressive features and performance. All four boards combine 24-bit display with video capture, and they all show live, 30-frames-per-second video preview windows on screen. In RasterOps' capture application, MediaGrabber, these preview windows can be scaled from one-quarter size (160 by 120) to full-screen size (640 by 480).

RasterOps' least-expensive product, the $1099 Video ColorBoard 364, is an analog NTSC/PAL/S-Video capture board that outputs only to the 13-inch Apple color monitor. The RasterOps 24STV ($1799) is an updated digital version of the 364, adding SECAM support, as well as an expansion connector for RasterOps' display accelerator or JPEG hardware compression boards. The 364 is a popular board—so popular, in fact, that RasterOps reintroduced it after first discontinuing it in favor of the 24STV.

Mike Hamilton, an ecologist in Southern California, recently switched from his ComputerEyes/Pro board to a ColorBoard 364 to grab images for his Macroscope Ecology Laserdisc, an interactive laser disc compendium of stills, motion video, and ecology facts.

To handle the greater computational needs of 19-inch and 21-inch monitors, there's the RasterOps 24XLTV ($3999), which includes a built-in QuickDraw display accelerator and the expansion slot. The fourth board, MediaTime ($2799), has all the functions of the 24STV and adds a feature no other board offers: 16-bit, CD-quality audio digitizing at a sample rate of 44kHz. It requires QuickTime to synchronize video and sound.

While a few of the other units—such as E-Machines' QuickView Studio and Computer Friends' ColorSnap 32+—can handle audio as well as video, they can't match the high quality and tight integration of MediaTime's functions.

RasterOps shows serious attention to quality in the software it provides with its boards. The software includes a plug-in module for Photoshop that lets you grab frames and immediately modify them. The MediaGrabber program has a good interface and ample controls to tweak the video picture before it is captured.

As a group, the RasterOps boards made the best video captures—with truer colors, better resolution, and fewer artifacts than all of the other boards (see "Video-Capture Comparison"). But the RasterOps boards aren't perfect. When capturing from a paused VCR, they can lose synchronization, causing an unstable or blurred image.

An unimpressive entry is the RadiusTV, which comes in two pieces: a NuBus board that does the actual capturing and an external box to which you connect video inputs and outputs. The good news is that one or more of the multiple inputs can be a standard TV signal, so you can watch TV—with sound—right on your Mac screen. You can even monitor other channels on smaller windows while watching and listening to the large preview window. The bad news is that you can capture images only to the Clipboard, not to disk; you can't capture 24-bit images unless you're also using a separate 24-bit Radius display board; and you can't automatically snap a sequence of captures.

Radius recently announced that it was purchasing video-capture technology from Apple, which should result in new products by midyear.

The high-end applications for video capture include image modification, output to videotape, animation, and automated sequence capture. Truevision's NuVista+ is the standout product in this market. In use at many video production houses across the country, the NuVista+ offers video overlay, which lets you place Mac graphics over video; chroma and luminance keying; titling; and several other on-board video effects. The board can take the manipulated video and output it directly to video recorders.

For automated capture into your computer or recording onto videotape of a series of frames, the NuVista+ interfaces to Diaquest's DQ-Animaq NuBus animation controller board. This board controls frame-accurate Betacam, D-1, or ¾-inch or 1-inch video decks, automatically rolling the videotape playback, then triggering the NuVista+ board to record an exact frame. The DQ-Animaq repeats the process for the subsequent frames. Because Truevision and Diaquest have plug-in modules for Photoshop, it's easy to automate the capture and processing of a sequence of frames.

Jack Butler, of Butler Graphics in Michigan, uses the NuVista+/DQ-Animaq/Photoshop combination to *rotoscope* and process frames for industrial videotapes. (Rotoscoping is an animation technique where live-action footage is traced over, or otherwise used as the basis for the final animated result.)

Butler needed to make a video sequence of a man talking look as though it was an animated watercolor painting. Using Affinity's Tempo II, he set up a macro sequence that finds and grabs a frame into Photoshop, applies Aldus's Gallery Effects Watercolor plug-in to transform the image, then records the changed image back to videotape. The whole process automatically repeats for as many frames as required. The beauty of the setup is that Butler can start the process, go home, and have a complete animated sequence waiting for him when he comes in the next morning.

The NuVista+ is a professional tool, so you need to make a significant investment in video equipment, such as timebase correctors and professional-quality video decks, to take full advantage of all its capabilities. But for professional video producers, it's the finest board available.

The Camera Option

ANOTHER OPTION FOR VIDEO CAPTURE is the digital still camera, which records an image either to a special floppy disk or to RAM for downloading to the Mac. Like film cameras, digital still cameras have the advantage of being portable and light.

Canon's Xapshot and the Sony Mavica MVC-CI require a video-capture board to digitize the analog image saved on the disk. Canon bundles the Xapshot with Digital Vision's ComputerEyes/Pro for $1099.

The Dycam Model 1 digital still camera records up to thirty-two 8-bit grayscale images, digitizing and saving them to RAM inside the camera. You need to use Dycam's software to download images to the Mac over a cable plugged into the modem port. Once you've downloaded the images, you can save them as TIFF files.

Making a Choice

THE QUALITY OF YOUR VIDEO CAPtures is pretty much related to the price you pay for the capture device.

For video capture on a rock-bottom budget (under-$400 street price), your first choice should be the ComputerEyes/Pro from Digital Vision or, if the released product is as good as the previews, the SuperMac VideoSpigot. The trade-off you make is that you don't get full-motion live video preview with these boards, so it's more difficult to zero in on a specific frame. And with lower prices comes a bit lower quality, too.

If you can spend only a couple of hundred dollars more, I recommend the Mass Microsystems QuickImage 24. The improvement in image quality over the lower-priced boards is worth it.

MW EDITORS' CHOICE

ComputerEyes/Pro Color Video Digitizer
A great deal for modest needs, this board offers a low price and adequate quality for use in publishing and visual databases. It lacks preview and other high-end options, but that's to be expected at its low price. **Company:** Digital Vision. **List price:** $399.95.

Video ColorBoard 364
For midrange users, this board offers clean captures, full-motion video preview, good software, and 24-bit display capabilities. Its only major disadvantage is that it works only on 13-inch RGB monitors. **Company:** RasterOps Corporation. **List price:** $1099.

MediaTime
The only board that includes high-quality audio digitizing along with video and display capabilities, it is an excellent all-in-one solution. **Company:** RasterOps Corporation. **List price:** $2799.

The RasterOps Video ColorBoard 364, although it's a couple of years old, is still a strong contender in the $700-to-$1100 price range. The board's clean captures, full-motion video preview, good software, and 24-bit display capabilities for Apple's 13-inch RGB AppleColor monitor make the ColorBoard 364 a winner. If you already have a 24-bit display board, Computer Friends' ColorSnap 32+ is another good choice for a board in this price category.

Once you cross the $1100 price point, the products begin to differentiate themselves by special function. The RasterOps MediaTime board is the only unit that includes high-quality audio digitizing, along with its video and display capabilities. As an all-in-one solution, it's an excellent product.

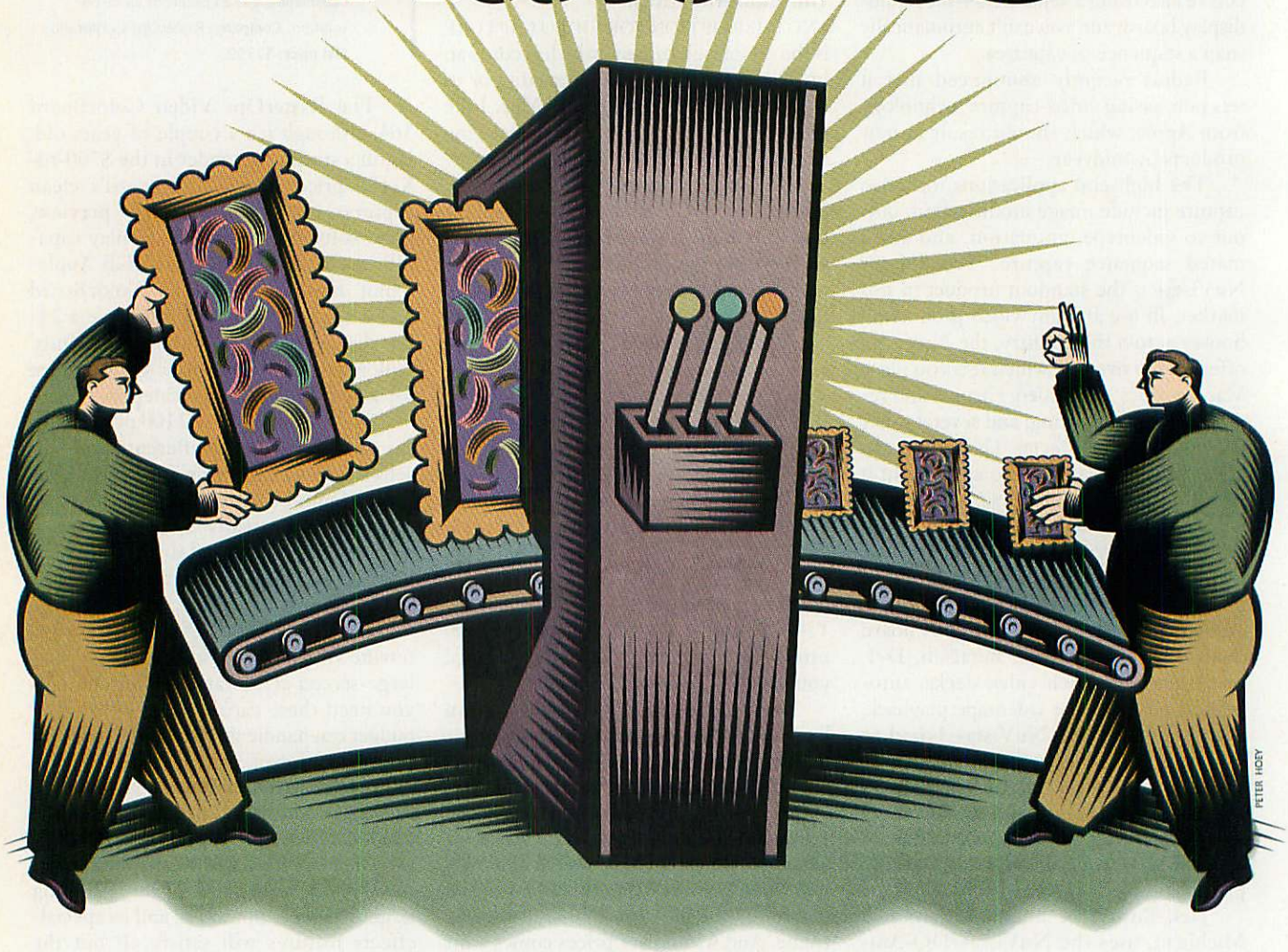
The RasterOps 24XLTV gives you terrific video-capture quality, along with large-screen accelerated 24-bit color. If you need these capabilities, and if your budget can handle the board's hefty price, it's the one to get.

And finally, Truevision's NuVista+ is the choice for the truly serious video producer. Its ability to be triggered by the Diaquest animation controller makes the NuVista+ invaluable for grabbing large sequences of frames, and its special-effects features will satisfy all but the most demanding video producers. **m**

See *Where to Buy* for contact information.

Tom Negrino is a *Macworld* contributing editor and a director of the Los Angeles Macintosh Group.

Image Compression Matures



PETER HOEY

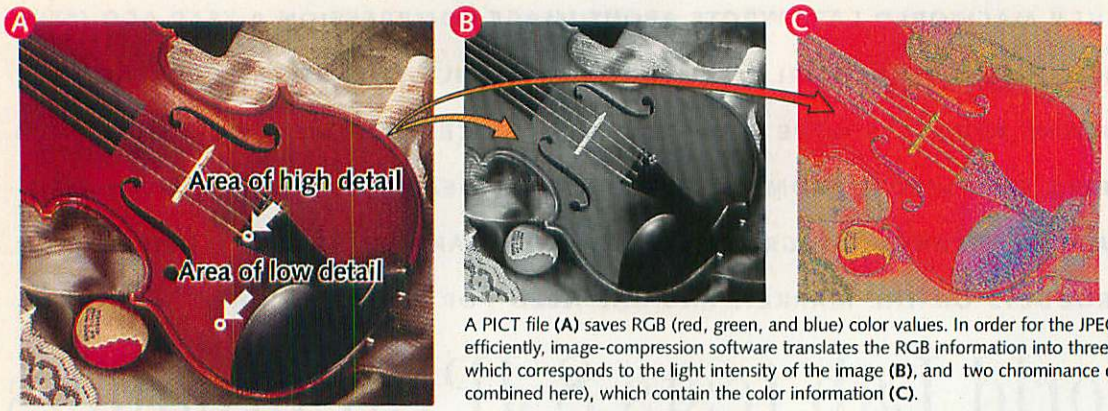
BY CHARLES SEITER

WHEN MACWORLD LAST WROTE ABOUT IMAGE COMPRESSION A YEAR AGO ("THE BIG SQUEEZE," MACWORLD, JANUARY 1991), ONLY TWO OF THE CURRENT CROP OF JPEG PRODUCTS WERE SHIPPING, AND A SYSTEM SOFTWARE SOLUTION FROM APPLE WAS JUST A PROMISING TECHNOLOGY DEMONSTRATION FROM THE ADVANCED TECHNOLOGY GROUP. TODAY THERE ARE EIGHT JPEG COMPRESSION PRODUCTS ON THE MARKET, AND THE NEED FOR THEM IS HIGHER THAN EVER.

Macworld Lab tests 8 JPEG products

● A single full-screen 24-bit color picture of a butterfly, for instance, takes as much disk space as does the customer database of a fair-size business. At a file size of 40MB to 100MB for the artwork on a display poster, the graphics library of a modest design firm will fill dozens of 650MB magneto-optical drive cartridges. ● A solution to these and other picture-handling problems was being prepared years before the Mac even had color. In Europe, a group of researchers working on early communications service experiments such as France's Minitel videotex system formulated an approach to image compression that was later refined and standardized as the JPEG (Joint Photographic Experts Group) specification. JPEG compression isn't the only way to reduce the space an image takes up, but it's used in all the products discussed here, and also in Apple's QuickTime (see "QuickTime in Motion," *Macworld*, September 1991). ● The JPEG algorithm is mathematically complex, but can be grasped fairly readily; JPEG's algorithmic description of a picture uses much less data than a bit-by-bit representation does (see "How JPEG Compression Works"). ● **Triangles versus Clouds** Consider a 640-by-480-pixel monochrome screen that shows just a black stripe running down the middle from top to bottom. One way to store this picture is as a bitmap, assigning each pixel to be either 1 (white) or 0 (black). In this form the description takes up 307,200 bits (640 x 480) or 38.4K. But the simplicity of the picture suggests that savings are possible; if you describe every bit, you can represent any black-and-white picture at all. By using one code that says where the black edge starts and stops on each scan line, and another code that says that all the scan lines in this picture are the same, you can reproduce the black-stripe image in much less than 1K. The rule is that you can get lots of compression if lines in the image repeat; a checkerboard is also easy to represent in compressed form. ● The key to compression for these simple figures is straightforward: if an image is more like a drawing than like a photo, you can save the image as a small set of instructions

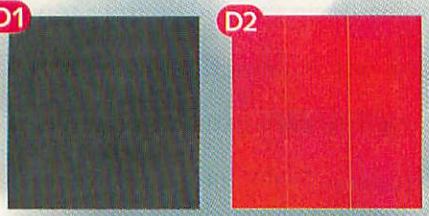
How JPEG Compression Works

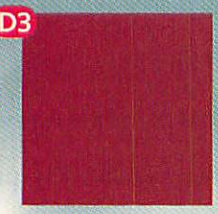


A PICT file **(A)** saves RGB (red, green, and blue) color values. In order for the JPEG algorithm to work most efficiently, image-compression software translates the RGB information into three components: luminance, which corresponds to the light intensity of the image **(B)**, and two chrominance components (shown combined here), which contain the color information **(C)**.

Low Detail







Before Compression

The JPEG algorithm first divides an image into 8-by-8-pixel blocks. Sample **D** shows a block with large areas of similar colors; sample **E** contains some fine details.

The information in each block goes through a discrete cosine transform (DCT), which describes the amount of variation of luminance (**D1** and **E1**) or chrominance (**D2** and **E2**) within each block. The less variation within the block, the more compactly it can be described.

During Compression

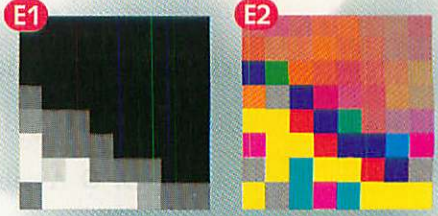
The JPEG algorithm looks at the color values in each DCT-transformed block and discards some of the information in a step called quantization. The higher the rate of compression the user chooses, the more information gets discarded, resulting in averaging or smoothing of the color variations over the block. Different quantization matrices are applied to the luminance and chrominance components.

After Compression

At medium compression, the low-detail areas of an image, such as **D3**, don't suffer much degradation. Areas of high detail, such as **E3**, however, suffer more obvious degradation as quantization changes subtle gradations to blocky areas of color.

High Detail







How JPEG Compression Looks

50 to 1



At a high rate of compression, the variations in each 8-by-8-pixel block are averaged out. Instead of having gradual gradations, the image looks slightly quilted, with larger areas of similar colors and abrupt transitions between areas of different colors.

25 to 1



At a medium rate of compression, the less-detailed areas of the image look good, but there is some mottling of the wood-tone colors at the bottom right of the violin soundboard, and the smooth gradation of tone on the black chin rest has become more abrupt.

2.5 to 1



At a very low level of compression, the image shows virtually no signs of degradation. At this level, JPEG is very close to a lossless image-compression technique.

rather than as a large heap of raw bits. Instructions that re-create a line drawing or a block drawing with repeating space-filling patterns are extremely efficient. Twenty to 30 lines of code take up only a few hundred bytes and can reproduce a drawing that would take a megabyte to store as a bitmap.

Except for a few tiny umbrellas and blankets and a bit of detail at the water's edge, a full-page color scan of a beach-vacation scene is basically a big blue swatch (two-toned, one for sky and one for sea) on top of a big yellow swatch. At 300 dots per inch and 24 bits per pixel, this 8½-by-11-inch color picture takes a little more than 25MB. Since the picture is really quite information-poor, with a huge area of blue sky that doesn't vary much, you should be able to represent it somehow with a much smaller compressed file. The trick here is not to represent the picture by encoding drawing instructions, but by averaging color values that apply to large areas of pixels.

Essentially, the JPEG algorithm divides the picture into little 8-by-8-pixel blocks. When the algorithm finds many blocks of the same shade of blue right next to each other, the algorithm creates efficient codes—"this block just like the last one"—that let the Mac reconstruct the picture with no apparent loss of image quality and with lots of compression. When the algorithm comes to the little patch of picture containing the tiny beach umbrellas, it stores more-detailed information, but also loses a bit of information, too. JPEG exploits a number of the facts of human vision (failure to see absolute color values, fuzzy perception at boundaries) to produce a decompressed image that looks like the original but contains less information.

This makes JPEG image compression different from the lossless file-compression used in archiving and disk-space-maximizing utilities (see *The Desktop Critic*, in this issue). The JPEG compression-decompression cycle does not re-create the original image file exactly, although some JPEG products feature a lossless option that provides modest compression. Lossless compression does not give you the 20:1, 40:1, or 100:1 compression ratios that JPEG can—compressed file sizes are likely to be only 40 to 60 percent of the original size—but lossless compression is the best choice if you are doing precision editing of an image with small details or sharp edges.

JPEG Effects

JPEG DEPENDS ON IMAGE SMOOTHness for optimal results, meaning, roughly, that JPEG works most effectively on blobs. A picture of the Great Red Spot on Jupiter can be compressed and decompressed at 100:1 without much loss of definition; the same cycle applied to a *Where's Waldo?* puzzle would pretty much eliminate your chances of finding Waldo ever again.

In a picture with mild gradation of continuous tones, you can compress it by 20:1 to 40:1 and see almost no difference in the decompressed image. If you compress the image further, you reach a point at which the decompressed image starts to show a blocky structure; here the algorithm reduces the picture to fairly coarse averaged squares of color. Details with fine lines, however, get smeared even at modest compression (see "How JPEG Compression Looks").

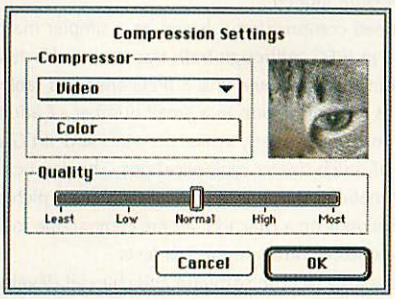
All the commercial file-compression packages, both hardware and software, are designed in compliance with the International Standards Organization (ISO) JPEG specification. They all have the same capabilities and restrictions on the basics of image processing—the image-resolution loss after 50:1 compression and decompression is about the same in any of the products. Limits on file-format handling, however, are specific to vendors. The JPEG procedure operates on any file represented as chrominance (the color part of a video signal) values and luminance (the black-and-white part of a video signal) values. It's up to the vendors to provide software that translates the red, green, blue (RGB) values stored in PICT, TIFF, or another format into these two components. Some day, any JPEG-based product will be able to decompress a file compressed with any other JPEG-based product. But judging from the state of the products examined here, "some day" is about a year and a half away.

Colorsqueeze

KODAK COLORSQUEEZE ISN'T THE fastest software compressor, by a wide margin in some cases, but it is the most reliable product tested here. Every file we tested on the Colorsqueeze compressed and decompressed properly, even the largest. Furthermore, Colorsqueeze restricts your options to the point where there's really nothing to learn—the only thing you can pick is a compression level, and the highest compression level allowed (20:1) won't obliterate your images. If you tend to work day-to-day on a small number of large pictures (so you can unpack a few files in the morning and repack them at night conveniently), Colorsqueeze is an excellent choice, and it insulates you from the details of the process. Once you pick Colorsqueeze, though, you are pretty much confined to Kodak's world, as files are most conveniently stored in the proprietary KIC (Kodak Image Compression) format and cannot be decompressed by other JPEG programs.

QuickTime JPEG Compression

Sometime in 1992, the image-compression business will change, and software-only compression products will start to disappear from the market. The reason is simple: QuickTime. Although QuickTime has been touted mostly as a multimedia, movies-on-the-Mac program, it includes PICTCompressor, an implementation of JPEG that can be used for still pictures. And it's more than adequate, according to developers: it's robust and at least as fast as current commercial products. Using developers' tools provided by Apple, developers will be able to offer JPEG compression as an option in an application in Open and Save As dialog boxes. In this glorious near future, images saved in compressed format in one application will be opened and decompressed in any other, simply as a result of adherence to Apple software developers' guidelines. Any application that currently supports PICT will support use of the compressed images. At Kodak, for example, product planners expect Colorsqueeze to fade away as a commercial product, leaving behind only a legacy of refined compressed-file handling in the company's printer line.



With Apple's PICTCompressor, the slider controls the quality of the compressed image. The higher the quality of the image, the lower the rate of compression.

Faster JPEG

Engineers at Ricoh's California Research Center in Menlo Park have been taking a hard look at the mechanics of JPEG image compression. Since transmission of large color files can cause a bottleneck in scanning and printing—not to mention color fax communications in the future—Ricoh set itself the task of finding the fastest computational version of JPEG, for use (as chip sets or software) in imaging products. The engineers found a fast version indeed.

The patented algorithm used to speed compression is based on a simpler mathematical transformation than that used in JPEG. Although both transforms effectively translate the spatially varying shadings in an image into a JPEG-specified table of numbers, the Ricoh approach does the translation in a small number of additions and shifts (fast operations for a microprocessor), while the standard JPEG approach depends on a larger number of much slower multiplications. The practical result of this switch in transform arithmetic is startling: a 1MB 24-bit color picture can be compressed at 25:1 in a few seconds on a Mac IIfx, a time comparable to results for the best hardware compression accelerators in our lab tests.

Ricoh is currently licensing its technology to both software and chip-set developers, and the first commercial products from these efforts are expected in late 1992.

ImpressIt

RADIUS'S IMPRESSIT IMPRESSES INdeed on certain files, but the relative speed is strongly image-size dependent. ImpressIt lags behind Colorsqueeze, for example, on large files, like the Strawberry PICT file and Antiques PICT file used in testing, that must be compressed using virtual memory.

One very useful feature of ImpressIt—enough to make it the application of choice if you handle dozens of files each day—is a Preview window. In the Preview window, you can view the effect of compression-decompression on a selected area of the image. This means you can pick a compression level—in this program you select it with a slider—and see the final effect on image quality. If you're very picky, you should choose an area of high detail to see what happens to these vulnerable image components when compressed and decompressed. Since for many applications the whole point of compression is discarding the bulky original to save space, it's more than helpful to be able to judge whether the retrieved, decompressed image will be good enough to use. ImpressIt compresses PICT and TIFF files and works without glitches in Adobe Photoshop.

PicturePress

STORM TECHNOLOGY WAS A PIONEER in image compression (its founder, Adriaan Ligtenberg, helped write the JPEG draft), and its PicturePress software is an experimenter's delight. If you're interested in understanding compression details or exploring the range of wild and wonderful special effects that can be produced with judiciously applied overcompression, PicturePress, a combination of hardware and software, is your only choice. For example, you can change the simple compression ratios or directly reset the separate tables that control the gray-scale and color content of pictures. By using different values in the tables, you can produce startling and unexpected color results.

Because PicturePress supports extensions (called JPEG++) to the original JPEG specification, you can do some further remarkable tricks. You can, for example, specify that a section of an image be compressed at a different ratio from the rest of the image. That means PicturePress is the only product that does a consistently good job of preserving small bits of text overlaid on an image, a significant point for advertising or other commercial graphics.

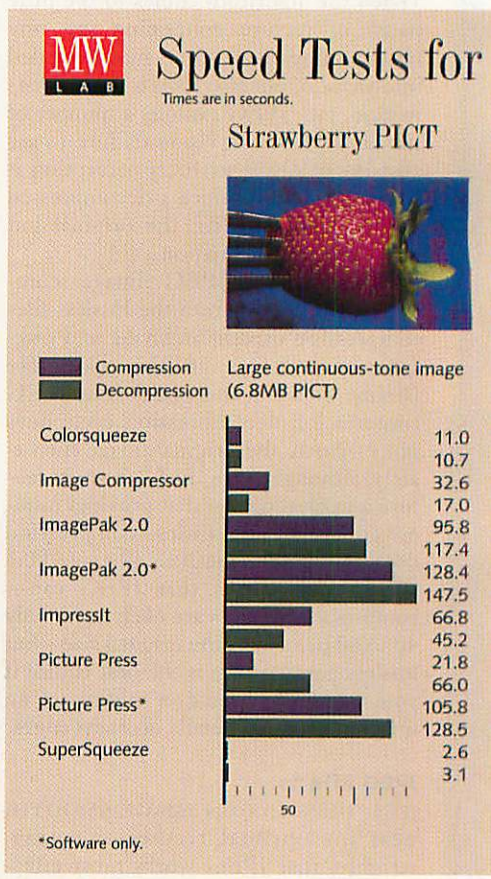
The software-only version of Storm's PicturePress is surprisingly slow. On the positive side, PicturePress presents, in addition to its special features, a miniature image with the Open dialog box so you can browse your files before opening them. Another big positive, promised for an upgrade in spring 1992, is support for the encapsulated PostScript (EPS) format, supported by most page-layout and prepress applications (Aldus PageMaker, Photoshop, QuarkXPress, Adobe Illustrator, Claris MacDraw, among others). When JPEG and EPS work together, JPEG handles continuous-tone color-image compression while PostScript instructions preserve details like fine lines and text.

Applications that support JPEG/EPS compression will send JPEG/EPS-compressed images directly to the new PostScript Level 2 printers, which will perform decompression before printing. Besides EPS support in PicturePress itself, Storm licenses a software developers' tool kit; the plan is to implement a desktop utopia in which all applications work with JPEG/EPS files; users only store and retrieve compressed images; and PostScript Level 2 printers, scanners, and graphics applications exchange compressed files exclusively.

In our lab tests, we were unable to successfully compress and decompress two of the large PICT images with PicturePress under System 7. We were easily able to do so, however, from within Photoshop when using the PicturePress Photoshop plug-in module, which provides more efficient memory-management schemes than Apple's virtual memory implementation does (see *Lab Notes*, in this issue.)

Hardware Compression

IMAGE COMPRESSION IS COMPUTAtion-intensive, and hardware implementations of JPEG can be fast because the JPEG algorithm allows computations to take place in parallel. Once an image has been divided mathematically into sec-



tions, the sections can be independently compressed at the same time. C-Cube Microsystems developed a JPEG chip, the CL-550, from an early draft of the standard (the silicon has been revised as the standard has changed). The CL-550 chip exploits this parallelism to increase speed, theoretically by a factor of 100 or more over software compression-decompression. In real Mac life, system overhead and file transfers from the hard drive slow things down, but hardware compression beats software implementation of the same method by about a factor of ten in most cases.

Hardware compression accelerators are available from four sources: Advent Computer Products, which sells the CL-550–based Neotech Image Compressor board ($999) made by Neotech in England; SuperMac Technology, with its own CL-550 unit, the SuperSqueeze Still-Image Compression Card ($999); Storm Technology, with its PicturePress Accelerator board ($999) designed around general-purpose digital signal processing chips; and RasterOps, with a custom compression chip in its new ImagePak Still Compression Board ($499). The overall speed champions, Neotech's Image Compressor and SuperMac's SuperSqueeze, show that the CL-550, being a dedicated JPEG processor, is currently the fastest way to squeeze.

SuperMac's SuperSqueeze, which uses a more closely integrated board design than Neotech's Image Compressor, is notably faster than the Image Compressor at RAM-based tasks and comparable when compressing large images, which are bottlenecked by virtual memory transfers from a hard drive. If you need to work with many compressed color image files daily, the SuperMac system, which also features compression-effects preview and thumbnail images stored with files, is not just the best hardware choice but also the best-designed hardware-software combination. The Neotech Image Compressor was unable to compress one of our large PICT files under System 7, although the same file was compressed successfully by using the Neotech image-compression module for Adobe Photoshop. A new release of the Neotech's software, due out in early 1992, is expected to fix this problem.

Images of the Future

IN THE FUTURE WORLD, WHERE QuickTime is a part of everyone's system, hardware compression boards will serve as QuickTime accelerators. In two years, users of image-editing software will barely need to be aware of compression issues since application software will make compression part of file management—you won't need to know how JPEG works any more than you need to know how a read-write head is designed or how electron guns in a monitor are aimed. Until then, artists and others with large files who need a solution should have at least an intuitive appreciation of compression technology. **m**

See *Where to Buy* for contact information.

CHARLES SEITER works in biomedical image processing for an electronics firm in San Francisco and tries to compress way too much into one day.

Macworld Lab testing supervised by Mark Hurlow.

MW EDITORS' CHOICE

Kodak Colorsqueeze For software-only compression, Colorsqueeze was the most dependable overall. **Company:** Eastman Kodak. **List price:** $179.

SuperSqueeze Still-Image Compression Card For a hardware and software combination, I'd choose SuperSqueeze for its speed and useful software. **Company:** SuperMac Technology. **List price:** $999.

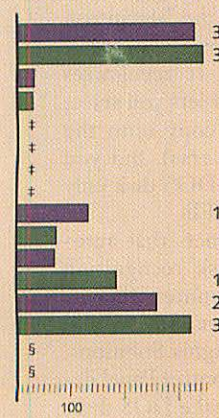
Image Compression

Macworld Lab tested all products with a Mac IIfx with 8MB of RAM, 330MB hard drive, 24-bit color board, and System 7.0. All figures listed are for a medium rate of compression.

Antiques TIFF



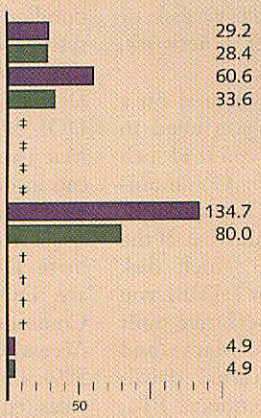
Large continuous-tone image, lots of detail (14.4MB TIFF)



Antiques PICT



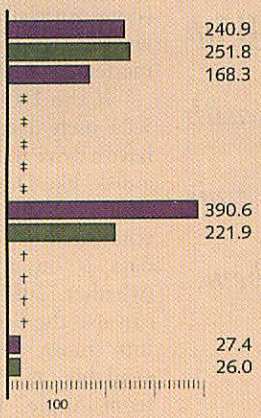
Large continuous-tone image, lots of detail (13.1MB PICT)



Network Illustration



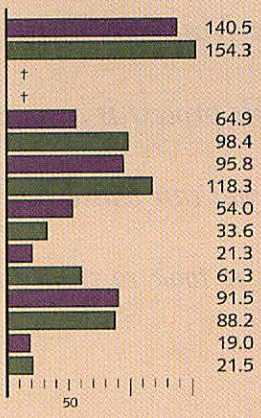
Not much detail, large areas of similar color (17.7MB PICT)



Gradient



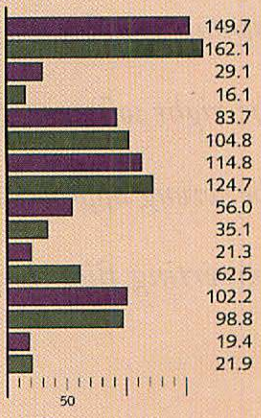
Black-to-white gradient (2.31MB PICT)



Gradient and Type



Black-to-white gradient with 9–72 pt. type (2.82MB PICT)



† Files were successfully compressed/decompressed using Photoshop plug-in module. ‡ Could not open file. § Does not support TIFF files.

Bridging Two Worlds

Picking the best route to Mac-DOS file exchange

BY CHARLES SEITER

Once upon a time, *people typed documents directly onto paper. This made documents hard to revise, but it had one great advantage: the format of the document was accessible to anyone with eyes. Today's disk-based documents are easily revisable, but files created with a Mac application are seldom directly compatible with those created on other computers. In a typical office, a worker might need to convert files from a colleague's DOS PC from WordPerfect 5.1 to Microsoft Word for the Mac, from DOS Lotus 1-2-3 to Mac Excel, or from PCX bitmap graphics to a Mac PICT file. With the right software, this process is a snap; with the wrong approach, you can waste more time converting files than it took to create them.*

File transfer is more than just getting raw data from one machine to another, although that's an important component. Transfer is also converting data from one format to another via a translation program or other conversion method.

Getting Across

THE FIRST STEP IS GETTING the data from one type of computer to the other. Two routes are available: via disk; or via transfer over a network, modem, or cable.

If the DOS data is on a 5.25-inch disk, you need to have a drive that can read such a disk, like Dayna Communications' $599 DaynaFile II, connected to your Mac. If the data is on a 3.5-inch disk (whether 720K or 1.4MB), you can use the SuperDrive built into most new Macs (and available as external drives from Apple, Kennect, PLI, and Dayna for owners of older Macs).

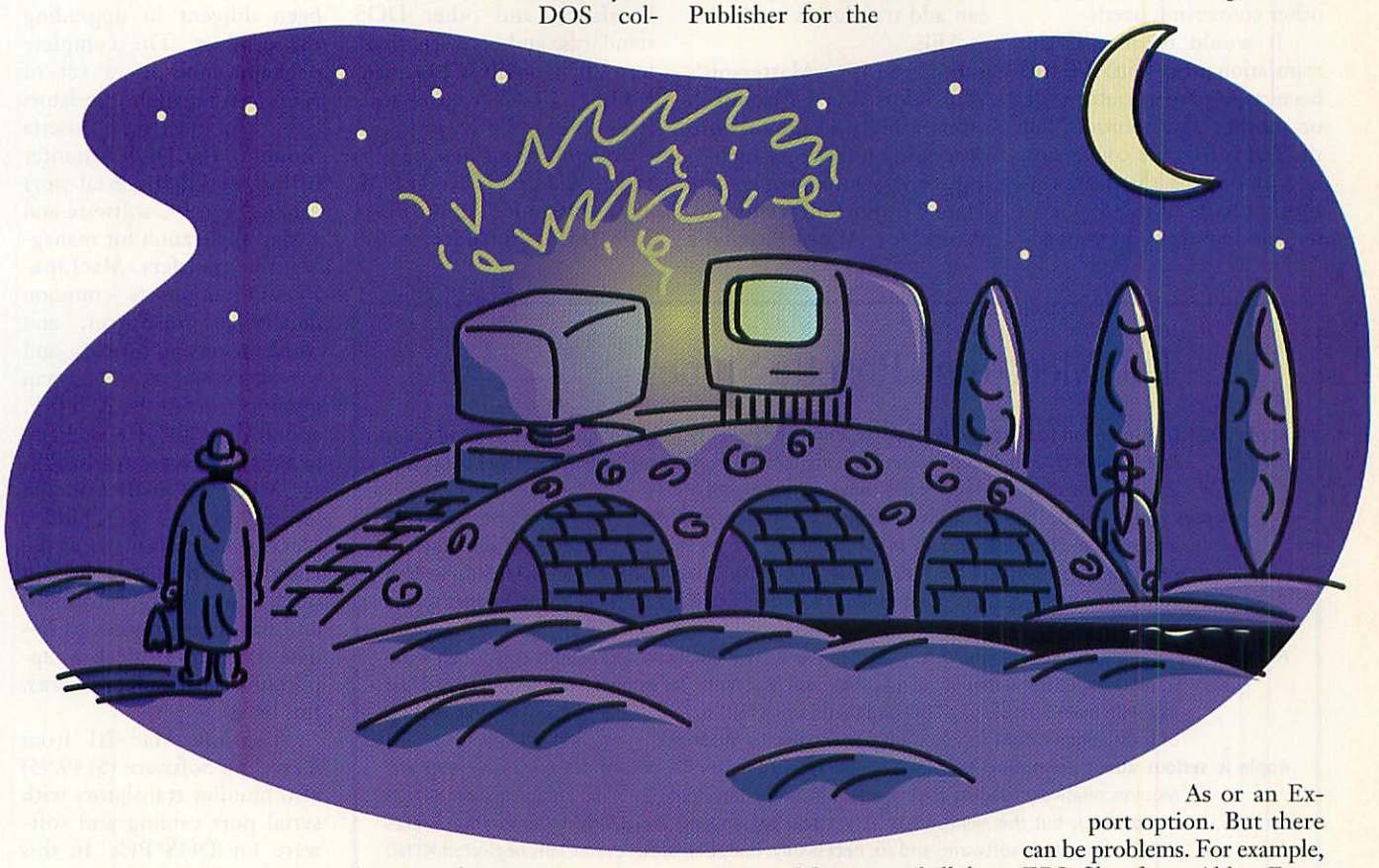
The 3.5-inch format is increasingly popular among DOS PC users, so the SuperDrive route is the most convenient. Because the data on a DOS 3.5-inch disk is stored in a different physical arrangement than on a Mac floppy, you can't just put the DOS disk into the Mac, see it on the desktop, and copy the files onto the hard drive.

The Apple File Exchange (AFE) program, which comes bundled with the Macintosh system software, takes care of this problem. It recognizes DOS disks and lets you select DOS files to copy onto the Mac (or vice versa). But you can insert the DOS disk only after loading AFE.

Two products that automate DOS-disk recognition are DOS Mounter (Dayna Communications, $89.95) and AccessPC (Insignia Solutions, $99). These Control Panel devices (cdevs) make DOS disks automatically appear on the desktop. For large installa-

tions, networking software offers the same disk-mounting function so you can see network server files on the Mac desktop automatically.

Until recently, Macintoshes could read DOS-formatted disks but not vice versa. Two products have changed that, letting DOS PCs read and write disks in 1.4MB Mac format on 1.4MB DOS drives (but not in the 800K Mac format). Both Mac-In-DOS from Pacific Micro and Mac-to-DOS from PLI let your DOS colleagues format a Mac high-density disk on their machines and read and write files from and to it.



PETER ALSBERG

Bilingual Software

IF A FILE HAS BEEN CREATED by a multiplatform application—one that has a file-compatible counterpart on both a Mac and a DOS PC—your work is done once you move the data from one program to the other through AFE or other data-transfer scheme.

For example, if you develop a DOS Windows Excel file with graphs and macros, when you open that file in Excel on the Macintosh in most cases those elements transfer faultlessly. The same is true for Microsoft Word, WordPerfect, Wingz, PageMaker, FoxBase+, and Ventura Publisher.

But the DOS programs are not always as supportive of cross-platform translation as their Mac versions are. For example, the DOS version of Microsoft Word cannot read the Mac Word format, although the Mac version can read the DOS format. Ventura Publisher for the Mac can read all the supported Mac and DOS text and graphics formats, but the DOS version supports only Mac graphics. When you throw the Windows version into the equation, you get even more mismatched exchanges among the three groups of formats. These mismatches are usually due to different release dates for the various platforms' versions.

A variation on the multiplatform theme are *multilingual* programs, which let you open files in one format and save them in another. Examples include Adobe Photoshop (which opens graphics files in a dozen formats and saves them in popular formats like TIFF, EPS, and PICT) and Ventura Publisher (which opens a text file in any PC or Mac format and can save the file in a different Mac or PC format).

The de facto standardization of TIFF and EPS formats for professional graphics means that almost every capable Mac and DOS graphics program stores its files in these formats through a Save As or an Export option. But there can be problems. For example, EPS files from Aldus FreeHand are not compatible for editing with the Adobe Illustrator–based EPS format used by most Mac and DOS graphics programs; Altsys's $150 graphics translator, EPS Exchange, solves this incompatibility. Also, many DOS PC programs save TIFF files by default as compressed; this compression may not be understood by a Mac application (or even another DOS application), so you may have to check the Uncompressed option before saving.

CGM (Computer Graphics Metafile, the ANSI-stan-

dard format that brought order out of chaos for the minicomputer graphics business) is also supported by more and more professional programs.

Seeking a Translator

MANY DOS PROGRAMS HAVE no Mac counterpart. For these programs you need a file *translator*. Apple File Exchange comes with one option only, a MacWrite to DCA-RFT translator, but you can add translators from third-party vendors like DataViz to handle other conversion needs.

It would be nice if the translation process in AFE had been reduced to a double-click or another easy solution, but the fact is that file conversion is still one of the least-optimized parts of the Mac system, and System 7 has not addressed some basic complaints.

Several translation programs ease the file-exchange process:

- The $159 Software Bridge/Mac translation package for word processors, now sold by Argosy Software, converts a wide variety of DOS document formats, including some pretty exotic ones, to Mac formats. With its own interface, Software Bridge/Mac provides a new file-recognition capability for nearly automatic translation, and the program can add translators to the list in AFE.
- For $149, Mastersoft's Word for Word Macintosh offers a big package of word processing translators, including many arcane formats like Mass-11 and FullWrite Pro. Word for Word boasts a flexible conversion interface but suffers from a too-terse manual.
- GraphPorter, a Chooser-level utility from GSC Associates ($169), takes files from Mac presentation and draw programs (PowerPoint, More, Canvas, MacDraw Pro, and others) and translates them into CGM format, which can be read by many DOS programs. Correspondingly, GSC's MetaPICT ($179) takes CGM files generated in Harvard Graphics, Lotus Freelance, and other DOS standards, and converts them into PICT or PICT2 format.
- Other CGM transfer utilities include GraphicsVu (Perkland Associates, $125) and PICTure This (FGM, $99). Graphics Link Plus+ 2.0b (HSC Software, $149) translates a variety of standard DOS file formats.

Common Links

FOR THE MANY PEOPLE WHO don't have a SuperDrive on their Mac, or have only 5.25-inch drives on their DOS PC, several vendors offer cable connections coupled with software translators to link the two platforms.

MacLinkPlus/PC 6.0 ($199) was one of the first file-exchange packages, and its developers at DataViz have been diligent in upgrading the product. The complete package includes a set of XTND-compatible translators (see "The Electronic Rosetta Stone?"), the DOS Mounter utility, serial-to-serial-port cabling, and PC software and a Mac application for managing the transfers. MacLinkPlus/PC supports common database, spreadsheet, and word processing formats, and a respectable set of bitmap graphics formats (PCX, TIFF, and BMP), all of which the program converts to PICT.

MacLinkPlus/PC is the leading program of its kind—DataViz supplies many of the translators that you find in other companies' products, and has the resources to update translators quickly as applications change (see *Reviews*, this issue).

LapLink Mac III from Traveling Software ($149.95) also bundles translators with serial port cabling and software for DOS PCs. In this case, the file translators actually do their work on the PC.

LapLink makes the minimalist assumption that you have DOS word processing files from one of 11 formats, from plain ASCII to XyWrite III Plus, and that you need to convert these files to MacWrite II. While any Mac word processor can open a MacWrite file, it means that if you are doing lots of conversions back and forth between several word processors, LapLink takes more effort than MacLink does.

Also, LapLink doesn't convert graphics or directly

The Electronic Rosetta Stone?

Apple's XTND is intended to simplify file transfer among different types of computers. Apple and Claris developed XTND to directly convert among formats from an application's File menu, bypassing the need to run a stand-alone conversion program.

If developers adopt XTND, they would write translators that convert their files to and from an XTND information-exchange format. In principle, this means that the developer of the fabulous new word processor Scribble, for example, writes only Scribble-to-XTND and XTND-to-Scribble converters, while vendors of other word processors similarly write their own bridges to and from XTND.

All XTND-compatible translators would be placed in the System Folder so applications could then share translators. To translate between Scribble and MacWrite, for example, the System would first translate from Scribble to XTND and then from XTND to MacWrite. To the user, this dual set of translations would appear simply as Scribble to MacWrite.

Apple is serious about promoting an XTND bandwagon (the Developer's Kit 1.3 costs only $30 and requires relatively modest coding effort from the developer to make an application XTND-compatible), but this vehicle has as yet few passengers. WordPerfect Corporation makes XTND-compatible software, and so, necessarily, does Claris, but even Claris neglected XTND compatibility in the current release of its Resolve spreadsheet.

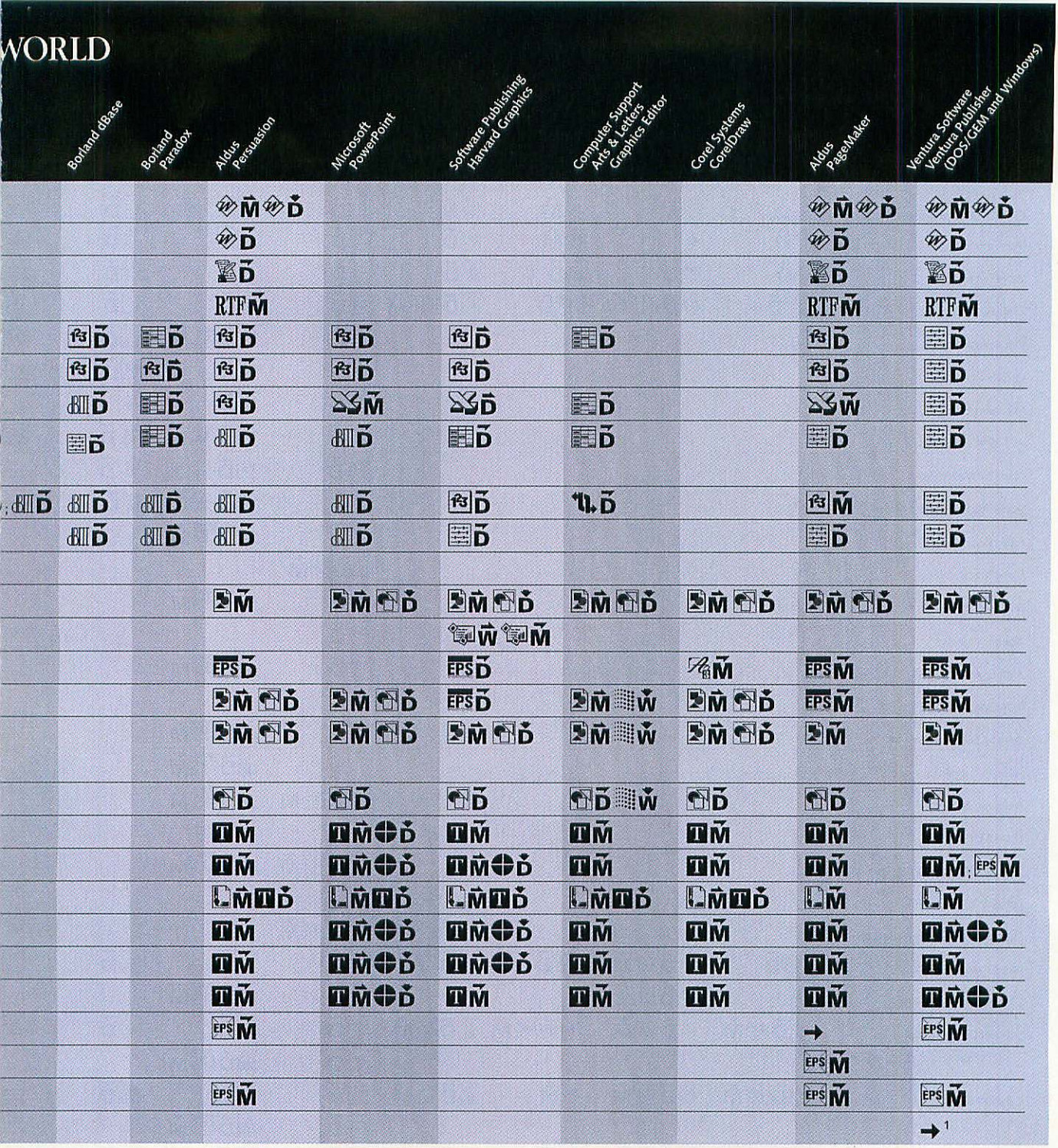
The XTND architecture has components for text and graphics translation, but so far text files have seen the most XTND activity. Database translation is minimally supported because data arrangement is an aspect of formatting that is difficult to develop a generic model for.

Although a few companies use XTND, its architecture is evolving in response to developer requests for the ability to handle a more complete set of formatting, to match the more powerful formatting of today's applications. "XTND is great," one developer said, "if your main concern is MacWrite II file exchange, but [XTND] doesn't save you all that much labor if your application has lots of special features."

In a better software world, all applications from the DOS side would have an XTND-compatible Mac equivalent, and you could work on files in your Mac applications only, your involvement in translation being limited to familiarity with your application's Open and Save As dialog boxes.

Another exchange standard being developed at Apple is Rich Text, which promises to let applications share text selections without losing formatting during such live exchange as publish and subscribe, cut and paste, and Clipboard copying. Theoretically, DOS applications (most likely under Windows) will be able to retain this formatting if they use the Rich Text standard. You will still need a method like XTND or file-translation software for full document exchange.

WORLD



dBase III
delimited ASCII
DIF (Database Interchange Format)
EPS (encapsulated PostScript) with preview
EPS with no preview
Lotus 1-2-3 WKS, WK1 (data)
Lotus 1-2-3 PIC (chart)
MacPaint
MacWrite II
Microsoft Excel (data)
Microsoft PowerPoint
Microsoft Word
PCX (PC Paintbrush)
PICT
RTF (Rich Text Format)
SYLK (Symbolic Link)
TIFF (tagged-image file format)
Windows Metafile
WordPerfect

TRANSFER PROCESS

save/export for direct open
save/export for import
translate file for direct open
translate file for import
direct (native format used by both applications)

DATA FORMAT

D DOS
M Macintosh
W Windows

[1]

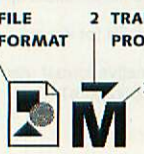
Transfer recommendations developed by Galen Gruman. Research assistance by Jim Feeley.

BEST FILE-TRANSFER ROUTES: DOS TO MAC

DOS / MAC	Lotus Development Ami Professional	Microsoft Word (DOS)	Microsoft Word for Windows	WordPerfect (DOS)	Borland Quattro Pro	Lotus Development 1-2-3 (DOS)	Microsoft Excel	Borland
Claris MacWrite II	D; D	M	M	M	D	D	D	
Microsoft Word	D	→	M	D	D	D	D	
WordPerfect	D	D	D	D	D	D	D	
T/Maker WriteNow	RTF D	D RTF M	RTF D	D RTF M	D	D	D	
Claris Resolve					D	D D	D	
Informix Wingz					D	D	D	
Microsoft Excel					D	D	→	
ACIUS 4th Dimension					D	D D	D	
Claris FileMaker Pro					D	D D	D; D	D
Fox Software Foxbase+/Mac					D	D D	D	→
Aldus Persuasion					D	1 2 3 D EPS M		
Claris MacDraw II					1 2 3 D M			
Microsoft PowerPoint					D	1 2 3 D EPS M		
Adobe Illustrator					D			
Aldus FreeHand					D	1 2 3 D EPS M		
Claris MacDraw Pro								
Deneba Software Canvas						1 2 3 D EPS M		
Adobe Photoshop						1 2 3 D EPS M		
Aldus SuperPaint					D M	1 2 3 D EPS M		
Claris MacPaint								
Electronic Arts Studio/8, Studio/32					D M	1 2 3 D EPS M [2]		
Letraset ImageStudio								
SuperMac PixelPaint Professional					D M			
Aldus PageMaker	RTF D	D M; D RTF D	RTF D	D	D; D	D; 1 2 3 D EPS M	D	
Letraset DesignStudio	D M	D M	W M	D M	D; D	D; 1 2 3 D EPS M	D	
QuarkXPress	D M	D M	M	D M	D; D	D; 1 2 3 D EPS M	D	
Ventura Publisher	D; D	D D; D M	W	D	D; D	D; 1 2 3 D EPS M	D	

Programs are grouped by function. [1] *Export from Windows Ventura Publisher only.* [2] *Import for Studio/32 only.* [3] *Microsoft Word DOS files cannot be imported into Macintosh Ventura.*

How to Read This Chart



This example reads "**1** PICT file **2** saved so it can be imported **3** as Mac data."

Each symbol has three components:

1 FILE FORMAT: the format the target program needs the file to be in (for example, MacPaint, PICT, Lotus 1-2-3).

2 TRANSFER PROCESS: the method for bringing the file into the target program (import, direct open, translation).

3 DATA FORMAT: the operating system associated with the target format (Mac, DOS, or Windows).

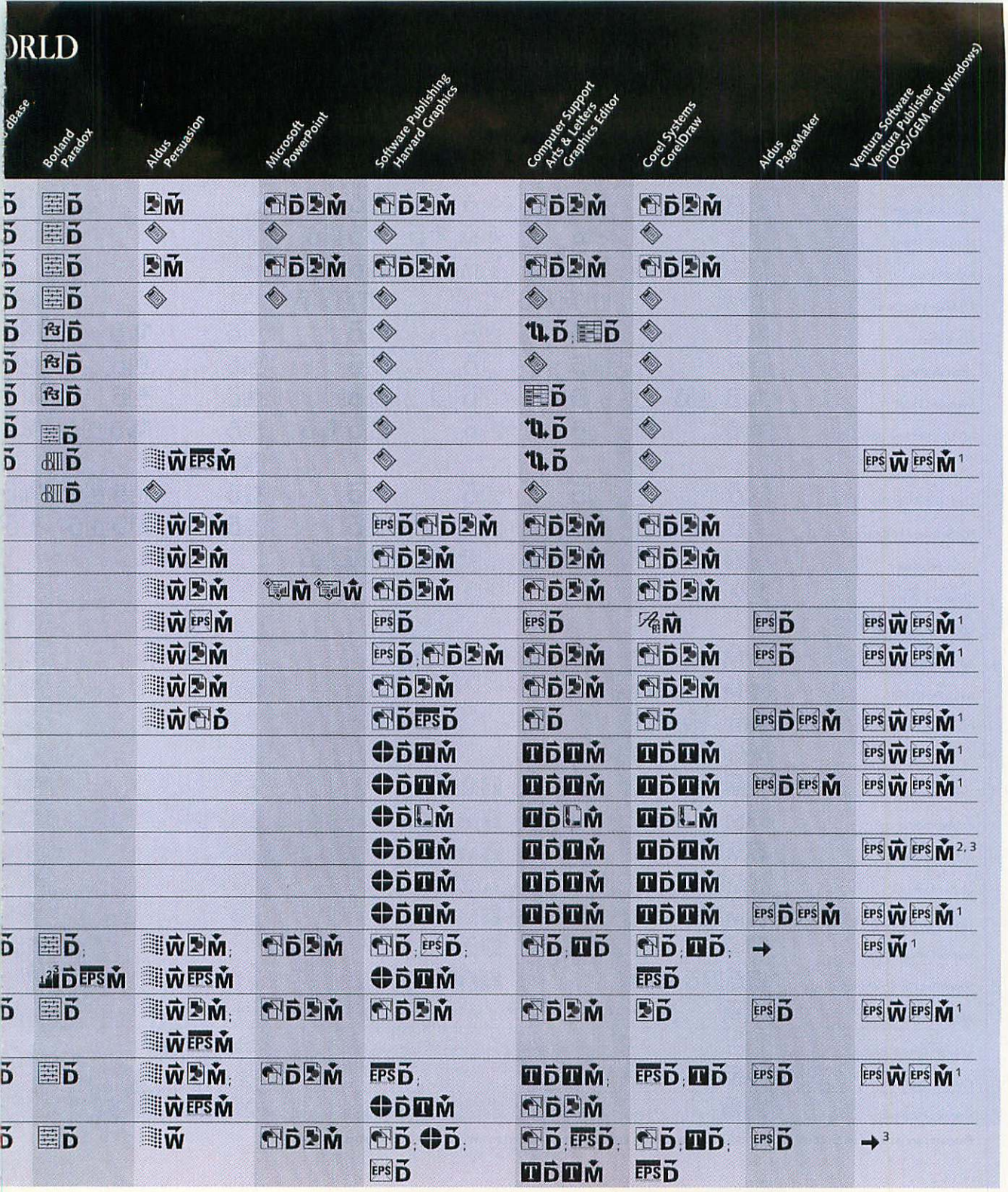
If there are two symbols, translation is required from the format saved by the source program to the format needed by the target program. The first symbol describes the format the translation program converts from, and the second describes the format it translates to. When there is more than one approach to file transfer, a semicolon separates the routes.

Legend

FILE FORMAT

- Adobe Illustrator
- ASCII (text only)
- CGM (Computer Graphics Metafile)
- Copy via Clipboard from a Mac graphics program
- DCA/RFT (Document Content Architecture/Revisable Form Text)

Transfer recommendations developed by Galen Gruman. Research assistance by Jim Feeley.



dBase III
delimited ASCII
DIF (Database Interchange Format)
EPS (encapsulated PostScript) with preview
EPS with no preview
Lotus 1-2-3 WKS, WK1 (data)
Lotus 1-2-3 PIC (chart)
MacPaint
MacWrite II
Microsoft Excel (data)
Microsoft PowerPoint
Microsoft Word
PCX (PC Paintbrush)
PICT
RTF (Rich Text Format)
SYLK (Symbolic Link)
TIFF (tagged-image file format)
Windows Metafile
WordPerfect

TRANSFER PROCESS

save/export for direct open
save/export for import
translate file for direct open
translate file for import
direct (native format used by both applications)

DATA FORMAT

D DOS
M Macintosh
W Windows

BEST FILE-TRANSFER ROUTES: MAC TO DOS

MAC \ DOS	Lotus Development Ami Professional	Microsoft Word (DOS)	Microsoft Word for Windows	WordPerfect (DOS)	Borland Quattro Pro	Lotus Development 1-2-3 (DOS)	Microsoft Excel
Claris MacWrite II							
Microsoft Word							
WordPerfect							
T/Maker WriteNow							
Claris Resolve							
Informix Wingz							
Microsoft Excel							→
ACIUS 4th Dimension							
Claris FileMaker Pro							
Fox Software Foxbase+/Mac							
Aldus Persuasion							
Claris MacDraw II							
Microsoft PowerPoint							
Adobe Illustrator							
Aldus FreeHand							
Claris MacDraw Pro							
Deneba Software Canvas							
Adobe Photoshop							
Aldus SuperPaint							
Claris MacPaint							
Electronic Arts Studio/8, Studio/32							
Letraset ImageStudio							
SuperMac PixelPaint Professional							
Aldus PageMaker							
Letraset DesignStudio							
QuarkXPress							
Ventura Publisher							

Programs are grouped by function. [1] *Macintosh word processing files cannot be imported into Windows or DOS Ventura Publisher.*

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1 FILE FORMAT: the format the target program needs the file to be in (for example, MacPaint, PICT, Lotus 1-2-3).

2 TRANSFER PROCESS: the method for bringing the file into the target program (import, direct open, translation).

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If there are two symbols, translation is required from the format saved by the source program to the format needed by the target program. The first symbol describes the format the translation program converts from, and the second describes the format it translates to. When there is more than one approach to file transfer, a semicolon separates the routes.

Legend

FILE FORMAT

- Adobe Illustrator
- ASCII (text only)
- CGM (Computer Graphics Metafile)
- Copy via Clipboard from a Windows graphics program
- DCA/RFT (Document Content Architecture/Revisable Form Tex

convert spreadsheets (you must save files in common formats such as SYLK or DB3). But it does let you customize conversions of embedded codes and file extensions.

All of these translators—both the stand-alone and bundled products—perform capably with straightforward formatting. But you can expect more-complex formatting, like macros in spreadsheets and multicolumn formatting in word processors, to go down the drain during translation because of the wide differences in how the source and target applications handle such formatting.

Transfer Tips

Fundamental differences between how the Macintosh and DOS operating systems work can confound those trying to transfer files from one machine to another. Each Macintosh file has a header that tells the Finder what kind of application to launch when you double-click on that file. This header also lets applications sort out incompatible files in the Open dialog boxes. But there is no such header in DOS files because there are no icons to double-click on—instead, you open DOS files after loading a program. DOS applications do make a stab at screening out incompatible file formats by looking at the file extension (the three letters after the period in the file name, such as *.DOC* for Microsoft Word); most programs use a unique extension for files they create.

Perhaps the most common transfer oddity occurs when transferring EPS files from one machine to another. EPS files are actually text-only files that contain instructions to create the desired text and graphics. Because the file is text, when you move the file from a DOS PC to a Mac, the Mac thinks the EPS file is a text file. Unlike DOS programs, which try to import any format you specify (even if incompatible), Mac applications that open EPS files ignore the EPS files marked as text. The solution is to change the file type from TEXT to EPSF using a utility like ResEdit; this change tells the Mac that the file is an EPS file.

While this problem is most common for EPS files, it might occur on other file types. Other handy creator types to know are TIFF for TIFF files, PNTG for MacPaint, PICT for PICT, TEXT for ASCII text, WDBN for Microsoft Word, and XLS3 for Excel 3.0.

Another issue in transferring EPS files is the internal bitmap many applications create so you can see an approximation of the actual image on screen. The format for this internal bitmap is different on the Mac than on the PC, and this difference sometimes prevents an application from importing an EPS file created on a different platform. If this occurs in your application, make sure you go back to the program you're exporting the file from, check any options that suppress the bitmapped preview, and save the file again.

Beyond Exchange

THE NEXT LEVEL OF MAC-to-PC connection uses the Macintosh to manipulate DOS files directly. Usually this means that you run a DOS application in a window on the Mac screen.

One popular product for this use is SoftPC from Insignia Solutions, an ingenious *software interpreter* that simply translates the commands in the DOS application into the Mac microprocessor's equivalents. The application, in one of its three variants—Classic/LC ($199.95); Entry Level Universal SoftAT ($325); and EGA/AT ($499), which requires that you have one of the other two variants—resides in its own partition on your hard drive. When you pull a DOS file from a floppy or the network, SoftPC operates on the file as if you had a real PC hidden in your Mac. SoftPC is relatively inexpensive, and its emulation works on all familiar DOS applications, but the applications run significantly slower than they would on a real PC.

A product designed to let you use DOS applications from the Macintosh but avoid this speed penalty is Argosy Software's RunPC 3.12 (network version $445; remote $219). The RunPC package bundles Software Bridge/Mac translators with Symantec's remote-terminal program pcAnywhere, under a slick new interface to let you run DOS applications as fast as your network can handle them (an 80386-based DOS PC at 33MHz is close to the speed limit for most networks). DOS applications under RunPC appear in a Mac window and show no apparent speed penalty.

The penalty, of course, is that you need a DOS PC to run the DOS programs (in a bare-bones configuration, you can skip the monitor and keyboard at the PC end). But this penalty is not severe, especially if the PC serves several Macs on the same network. Macintosh users are sometimes shocked to find that an $1100 DOS PC will run the Windows version of Excel faster than "real" Excel runs on a $6000 IIci.

RunPC also offers a notable improvement on earlier Mac file-transfer programs: the Software Bridge built-in format identifier. This means that when you double-click on a DOS document (DOS disks are mounted with an included utility), the software identifies the appropriate conversion and opens it in the appropriate Mac application.

Choosing a Solution

THERE IS NO BEST PACKAGE or approach to file transfer, since you likely have to deal with the diverse equipment and software you or your clients already have. But you can select a solid solution for your environment.

If your file transfer is within a department or company, the best approach is to equip your Macs with SuperDrives and use applications like Excel and PageMaker that are file-compatible on DOS and Mac PCs. You'll likely want to boost ease of transfer by using Software Bridge/Mac rather than rely only on Apple File Exchange; doing so also covers you better for applications for which you don't have file-compatible cross-platform programs and for the occasional need to translate a format from an outside source. If you do a lot of transfer, look into setting up a network that supports both DOS and Mac PCs. This is the most seamless transfer approach.

If you operate a service bureau dealing with a diverse set of clients, you'll also want hardware like the DaynaFile or a hardware-software combination like SoftPC. Which you choose depends on the programs you and your clients use. The wider variety of programs you and your clients use, the more attractive the SoftPC option is. But that means you'll have to know how to use the DOS programs as well as you do the Mac ones. If your primary goal is to move DOS data to a Mac for further work (like editing or output), focus on supporting the two kinds of DOS floppy disks (3.5- and 5.25-inch) formats rather than on DOS programs. **m**

See *Where to Buy* for contact information.

CHARLES SEITER is a *Macworld* contributing editor.

The Quadra Quandary

COMPATIBILITY PROBLEMS WITH THE QUADRA FADE AS SOFTWARE DEVELOPERS RESPOND

BY OWEN W. LINZMAYER

photographs by David Scharf

WHEN APPLE COMPUTER INTRODUCED the high-end Macintosh Quadra series last October, prospective buyers were simultaneously lured by claims of stellar performance and repelled by rumors of widespread software incompatibility. At the time, those concerns were legitimate; numerous best-selling programs crashed immediately on takeoff, essentially grounding the high-flying Quadra. The only solution was to sacrifice performance for compatibility by turning off the area of memory known as the processor cache. Unfortunately, disabling such a vital piece of the Quadra's architecture reduces performance to Mac IIci levels.

Whether you currently own a Quadra or are considering buying one, it's important to understand the scope of the compatibility problem. I'll explain the technical reasons why Quadra incompatibilities occur, teach you how to spot problems, and discuss workaround solutions. Luckily for those of you who are going to spend the $5700 to $9200 necessary to purchase a Quadra, most developers have already released, or will soon be releasing, updates that address the incompatibilities.

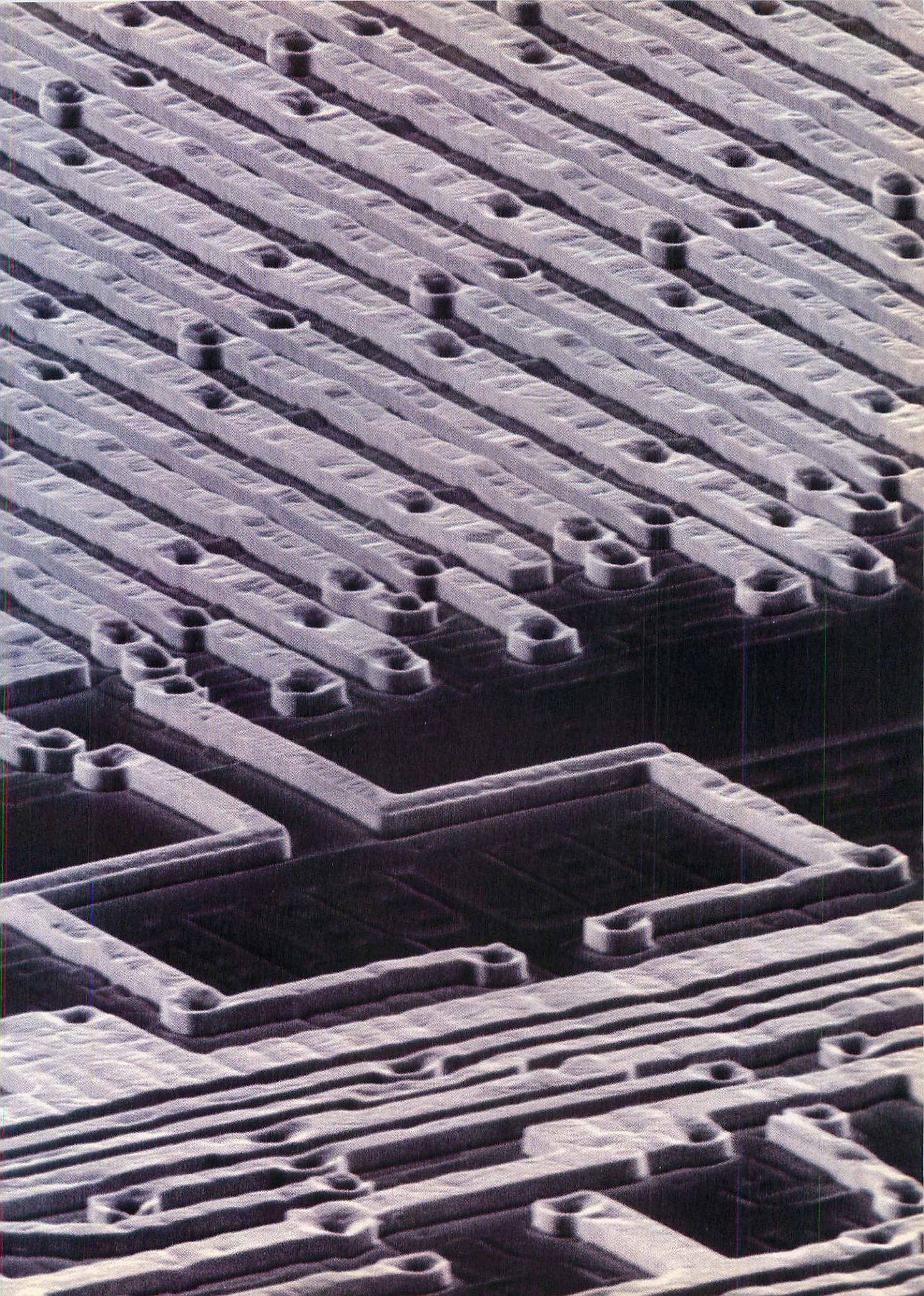
Crashing Cache

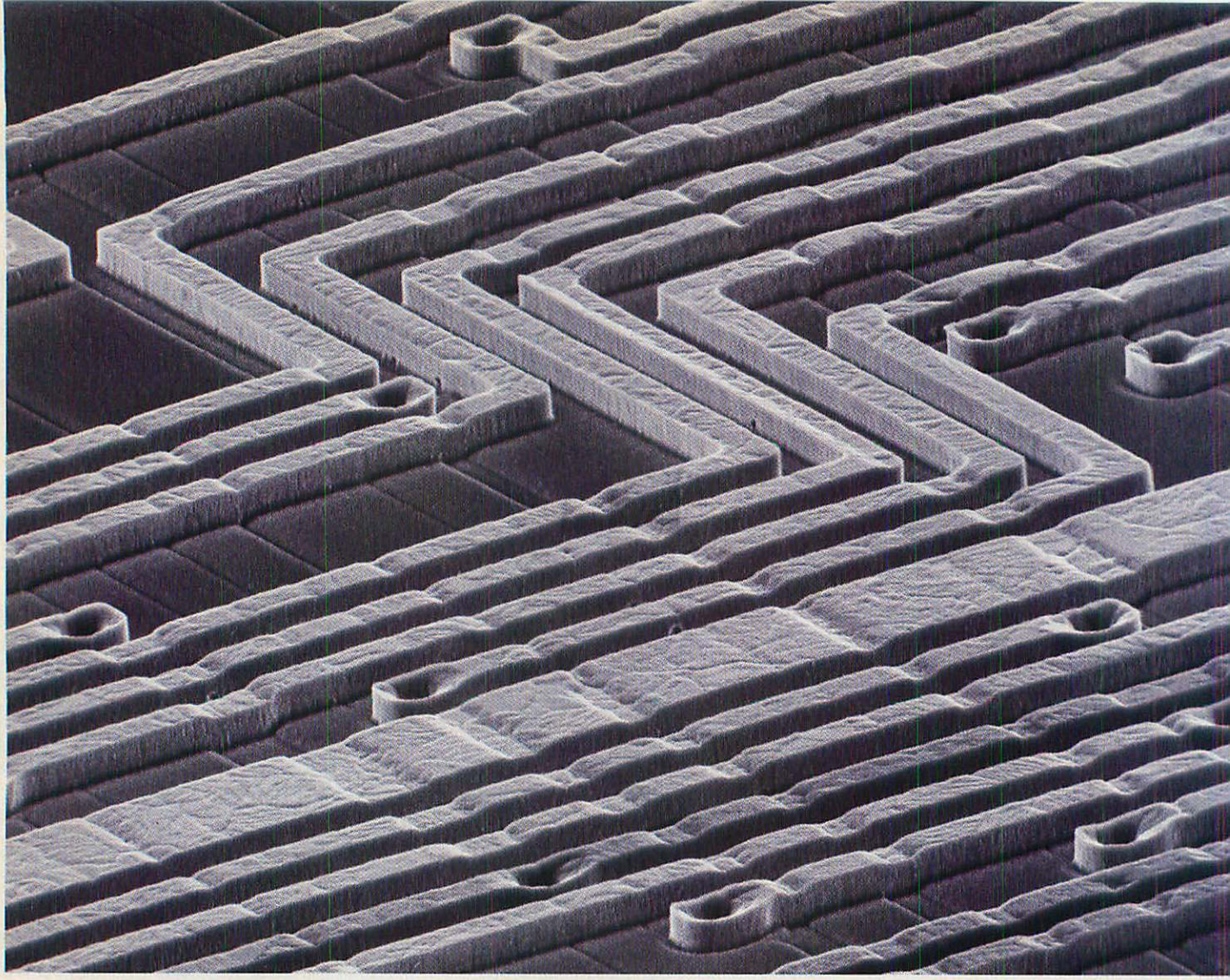
THE MAIN COMPATIBILITY CULPRIT IS the 25MHz 68040 central processing unit (CPU) used in the Quadra. Motorola's latest 68000-series processor has separate 4096-byte data and instruction caches. If a program refuses to run on the Quadra, the problem is almost invariably related to the unique 040 caching system. (Incorporating certain floating-point functions in the 040 has caused some other problems, but not on the same scale as the cache.) In fact, third-party accelerators based on the 040—such as Fusion Data Systems' TokaMac and the Radius Rocket—are afflicted by the same problems as the Quadra. But these products have the option of using the 68030 on the main logic board if circumstances dictate, a luxury not available on the Quadra.

In the broadest terms, a *cache* (pronounced *cash*) is a relatively small, fast memory area that holds the most recently used data. Used effectively, caching dramatically increases overall system performance. For example, the Disk Cache (once known as the RAM Cache), when turned on with the option in the Memory control panel, reduces the amount of time required to get information off a disk and into main memory. Processor caches—such as the ones in the 68040—operate on the same principle, but they reduce the time required to get information from main memory to the CPU. Theoretically, the two types of caches can work in harmony to greatly increase overall system performance. The Disk Cache has nothing to do with the Quadra's compatibility problems; those are caused by the 040's unique processor caching system.

The 68040 cache operates in *copy-back* mode: information that is written directly to the cache is updated in main memory only when there is a specific instruction to do so. A flush command causes the most recent data written to the cache to be transferred to main memory. The *write-through* mode used by the 256-byte data cache in the 68030 operates differently. When a new data value is written to an address found in the cache, both the cache and the main memory are updated simultaneously. Although this ensures that data in the cache matches the data in main memory, writing the same thing in two places takes time. The copy-back mode used in the 040 can maximize performance, but it can cause problems with applications

Shown here at 6670x magnification is a section of the instruction cache for Motorola's 68040 microprocessor. It is at the heart of current compatibility problems between Macintosh applications and Apple's new Quadra line.





The Data Memory Controller This is a close-up view—6120x magnification—of a section of the 68040 Data Memory Controller, which controls data flow into and out of the 68040. The zigzag lines are control signals, leading data into and out of the DMC unit.

that do not follow Apple's development guidelines closely.

The worst offenders are applications that use self-modifying code. Many Mac programs are segmented into small blocks of code that are loaded into memory as needed. For instance, to generate hard copy, an application may graft the necessary print routines from the hard drive into the program currently loaded into RAM. There's nothing wrong with this. In fact, Apple provides developers with standard routines that handle code blocks.

Problems can occur with the Quadra in applications where programmers violate Apple guidelines for writing self-modifying code by treating that code (instructions) as data. The 040 stores these recently added instructions in the data cache but doesn't write them through to main memory, as the 030 would. When the program subsequently looks directly to main memory for these instructions, the program executes the instructions last stored at the designated addresses. These instructions are usually incorrect and cause the program to crash.

If there's a saving grace, it's that Quadra cache problems are fairly easy to spot. Usually an alert box appears immediately upon launching, explaining that your application "unexpectedly quit" and listing an error code. On the other hand, some applications launch properly and then freeze once you attempt to invoke a specific function.

The Quick Fix

ANTICIPATING THE PROBLEMS THAT the new 040 would cause end users, Apple Computer includes a Cache Switch control panel as part of the system software that accompanies the Quadra. Cache Switch lets you avoid problems by turning off the CPU caches altogether. This slows the Quadra's performance down to Mac IIci levels. For example, recalculating a 14,487-cell Excel 3.0a spreadsheet requires an average of 25.01 seconds when the cache is used. With the cache switched off, the Quadra takes three times as long, just barely edging out a Mac IIci, at 77.20 seconds. As if that weren't frustrating enough, you must restart the Mac each time you change cache states.

It seems almost as if Apple intentionally inconvenienced Quadra buyers in an effort to coax upgrades of offending products from recalcitrant developers. After all, both Fusion Data Systems and Radius allow users of their 040 accelerators to scale back to write-through mode or disable caching altogether on an application-by-application basis without requiring a restart. Apple could have incorporated similar features in Cache Switch, but then developers wouldn't have had as much incentive to address the underlying problem.

"The goal of Cache Switch is to keep people going," says Frank Casanova, product manager for high performance CPUs at Apple Computer. "The downside is that the copy-back cache is a key part of the 040 architecture, and giving it up severely compromises the Quadra's performance . . . but at least you can keep working with your existing programs."

For those who don't want to turn the cache off for all applications just to keep working, Alysis Software has announced the Compatability INIT, which will let users specify which applications are in-

compatible with the 68040's cache. That way, users can deactivate the cache automatically when using incompatible applications. The program will be distributed free to individuals on BBSs; corporate users should contact Alysis directly for licensing information.

Developers Fall in Line

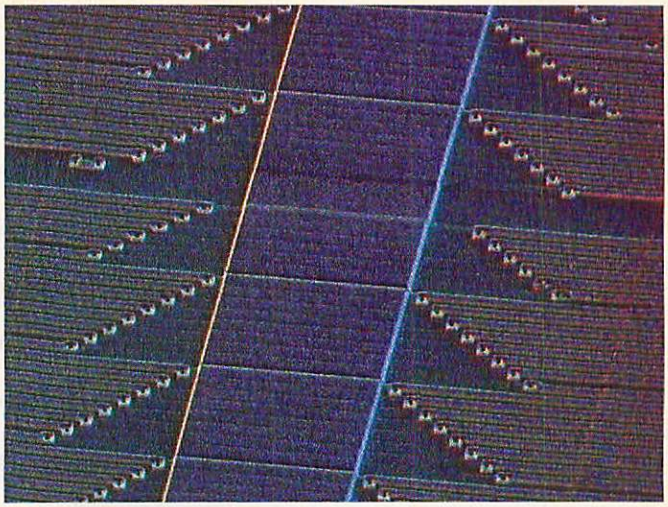
IF YOU HAD JUST SHELLED OUT $10,000 for the top-of-the-line Mac but could realize only a third of its computing power, you'd be upset, and rightly so. Anxious about incurring the wrath of angry Quadra users, the Macintosh developer community has made an all-out effort to update its commercial programs to comply with the new 040 caching scheme. Still, the transition has been less than smooth; at press time *Macworld* was suffering compatibility problems with Aldus PageMaker and Aldus FreeHand.

"For developers the fix is extremely simple if their code is written in a conventional manner," claims Craig Prouse, a developer-technical-support engineer at Apple Computer. "All they have to do is flush the cache, which typically requires that only two instructions be added to their code."

Macintosh software developers seem to agree with this assessment. "Fixing our Quadra incompatibilities was as simple as recompiling with the new 'cache-aware' versions of MacForth and Think Pascal," says Young Harvill, director of 3-D product development at MacroMind/Paracomp.

Developers' biggest problem is isolating the section of code where the flush fix needs to be inserted. "It requires a new debugging skill," explains Prouse. "A lot of developers don't understand the new hardware well enough to know the ramifications of the cache. Flushing the cache properly doesn't hurt performance. In fact, you can flush only the portion of the cache that is of interest. But if you are repeatedly flushing large portions of the cache, there's a performance hit and it's likely you are doing something unorthodox."

From a performance standpoint, the worst possible case is what Microsoft was doing with its proprietary P-Code, an intermediate machine language that takes up half the space of native 68000 code, allowing more functionality in smaller files. On execution, the machine-specific P-Code interpreter builds *jump tables*, guideposts that determine which address to jump to based on input. Like other programs, the early P-Code interpreter neglected to flush the contents of the cache. "The fix was relatively easy," confirms Art Schumer, group manager of Macintosh technology at Microsoft. Unfortunately, performance suffers because the cache must be flushed frequently as the interpreter converts each P-code instruction to a 68000 instruction. So in cases where speed is an issue, Microsoft opted to rewrite using the 68000 instructions instead of P-Code.



Floating-Point Unit This 900x magnification of a section of the 68040's floating-point unit was produced by a scanning electron microscope (SEM) connected directly to a Macintosh. See *Art Beat* in this issue for an in-depth look at the unique process that was used to create color images from an SEM.

The Price of Power

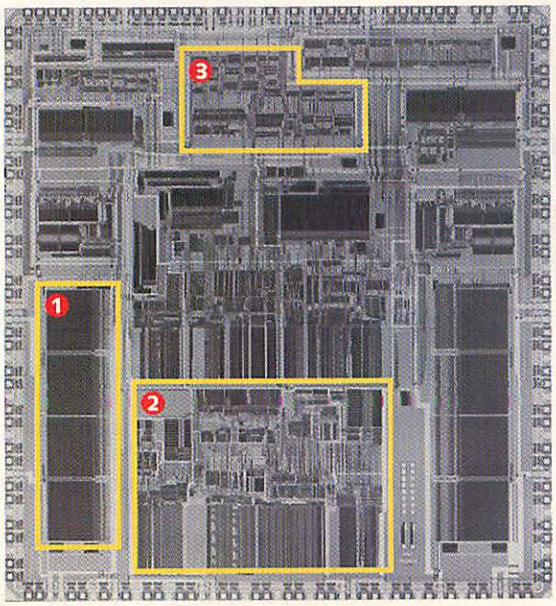
WHENEVER A MANUFACTURER CREATES innovative hardware, it is bound to disturb the status quo. The Quadra left a good deal of incompatibility in its wake, despite the fact that the Quadra is merely an evolutionary advance in the Macintosh series. While we will probably soon see a Quadra sporting a faster version of the 68040, the next great performance leap is going to require a fundamental change in CPU design.

For now, almost everyone—third-party programmers, 040 accelerator manufacturers, and Apple representatives—seems to think that the Quadra cache incompatibility is a short-term issue. As of this writing, many developers had already released new 040 versions of their problem programs, or were planning to do so by the end of 1991. For the most part, updates are available on request for a nominal charge.

Initial testing in the Macworld Lab indicates that the updated programs function smoothly with no noticeable performance degradation. So if you've been putting off the purchase of a Quadra for fear of crashing due to compatibility problems, it now appears safe to take out that second mortgage and start computing at warp speed. **m**

The Bigger Picture

Motorola's 68040 has several key innovations that make it faster than its predecessor, the 68030, but initially less compatible with existing Macintosh applications.



1 The Instruction Cache allows the microprocessor to execute instructions more quickly by offering a 4K physical cache that stores the most-frequently-used instructions.

2 The Floating-Point Unit incorporates subsets of the functions handled by a separate chip on the 68030. It operates concurrently with the integer unit so that integer instructions don't have to wait for completion of a floating-point operation.

3 The Data Memory Controller prioritizes memory reads and writes, controls the flow of data into the 68040 integer unit, and loads integer and floating-point results back into the cache.

OWEN W. LINZMAYER is a free-lance writer in San Francisco.

17 paint programs close the gap between electronic and traditional techniques

Paint Imitates Life

by Deke McClelland

THERE'S NO SOFTWARE MORE FUN TO PLAY WITH than a paint program. Without exception, a computer neophyte can sit down and doodle out images, even if that person hasn't the slightest grasp of artistic technique. A single bright line on screen becomes the object of enjoyment.

While nonartists have enjoyed dabbling with paint programs, professional artists have had good reason to shy away from computers. Paint programs may be fun, but what good is any artist's tool if it doesn't let you draw quickly and intuitively to produce predictable results?

But a new generation of paint programs is arriving that will delight both novices and professional users by giving them a suite of tools and canvases that produce a diverse range of realistic painting techniques. By emulating traditional painting techniques, paint programs have begun to bridge the gap between the familiar world of the artist and the awkward world of bitmaps. Rather than force me to adapt, paint programs have made peace with me.

Pressure of Real-World Emulation Whether your painting needs are casual, professional, or both, an enormous variety of paint programs are available. With so many new paint programs sprouting up, there must be some exciting stuff happening in the painting market. Right?

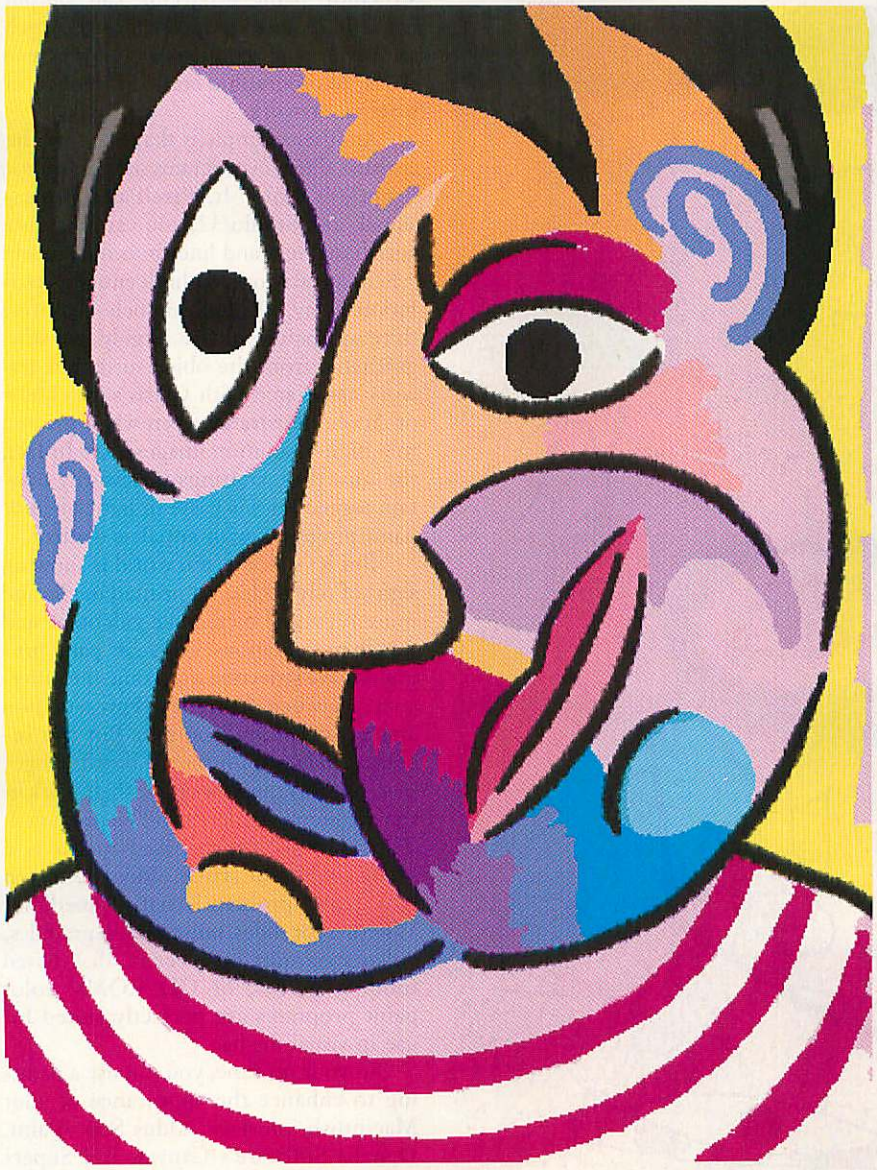
Well, yes and no. Mostly no. Most of the programs that I covered in last year's roundup of 24-bit color paint programs (see "The Electronic Palette," *Macworld*, April 1991) offer the same set of familiar features they did last year. Paint programs still have not evolved to add new technologies or significant new features: capabilities like anti-aliasing, special selection, and transformation continue to represent the high end of paint programs' functionality.

But there are some early signs that paint programs are starting to make headway in a new direction. It may sound like a big step backward, but some programs are finally providing tools that emulate their traditional counterparts. Imagine a standard pencil tool that actually draws

like a pencil instead of some kind of glorified Etch a Sketch. These tools could be the best thing to happen to paint software in the last seven years.

In a way, the new direction is due to the Wacom pressure-sensitive tablet. The Wacom tablet has been popular with CAD users on DOS personal computers for some time, but the tablet's potential to allow real-world paint tools did not become obvious until Macintosh artists and software developers realized its abilities, once a Mac version became available. Now, paint programs are quickly making the most of pressure-sensitive tablets.

Take Fractal Design Corporation's Fractal Design Painter, for example, easily the most interesting paint program to debut this year. Painter is the only application available now in which every painting tool reacts to stylus pressure. Rather than the usual assortment of pencil, eraser, paint bucket, and geometric-shape tools, Painter offers a single paintbrush. After selecting the paintbrush, you can choose from any of 52 "brush" tools, including pencils, chalk, charcoal, felt pens, crayons, and brushes (see "Everything Old Is New Again"). Not only does each tool operate just like its real-world counterpart, but you may also customize tool brushes as well as create and save your own.



The Spanish artist Pablo Picasso is known for combining and contrasting geometries, often presenting images with clean lines and little embellishment. Artist Scott Baldwin used Fractal Design Painter and a pressure-sensitive Wacom tablet to emulate Picasso's style. He found that the combination simulates real-life tools well. "For varying strokes' effects, the program's pastel tool was remarkably similar to an actual pastel," he said.

Some of Painter's tool settings are similar to those of other programs. For example, Painter offers a Brush Size window in which you can change the size of the tool, just as in MacPaint. But the options don't end there. You can also adjust the tool's shape, assigning it a sharp point or a rounded tip. When creating a calligraphic tip, you can specify the ratio between the cursor's horizontal and vertical dimensions as well as its angle.

Painter has the best—but not the only—support for the Wacom pressure-sensitive tablet. Deneba Software's UltraPaint and Aldus's SuperPaint provide tools that react to pressure. SuperMac Technology's PixelPaint Professional and Electronic Arts' Studio/32 support pressure sensitivity across a wide range of tools. But only Painter and Time Arts' Oasis let you specify how pressure affects performance.

Oasis lets you link pressure to the cursor's size, the ink's opacity, the ink's color, or any combination of the three. For example, using Oasis's ink-color option, you can create a rainbow line simply by pressing down and letting up on the stylus as you draw. When using the Artist Brush tool, the pressure can affect the ink's "wetness," making the line appear smooth when you press hard and coarse when you press lightly.

Except for the wetness option, Painter matches Oasis's pressure sensitivity. Painter also lets you link cursor size, opacity, and color to drawing speed and direction.

Surfaces and Filters

IN TRADITIONAL DRAWING, TWO CRITERIA affect the appearance of an artwork. In addition to the properties of the tools themselves, you have to account for the texture of the paper or canvas. So far only two programs provide specific texture features: PixelPaint Pro and Painter.

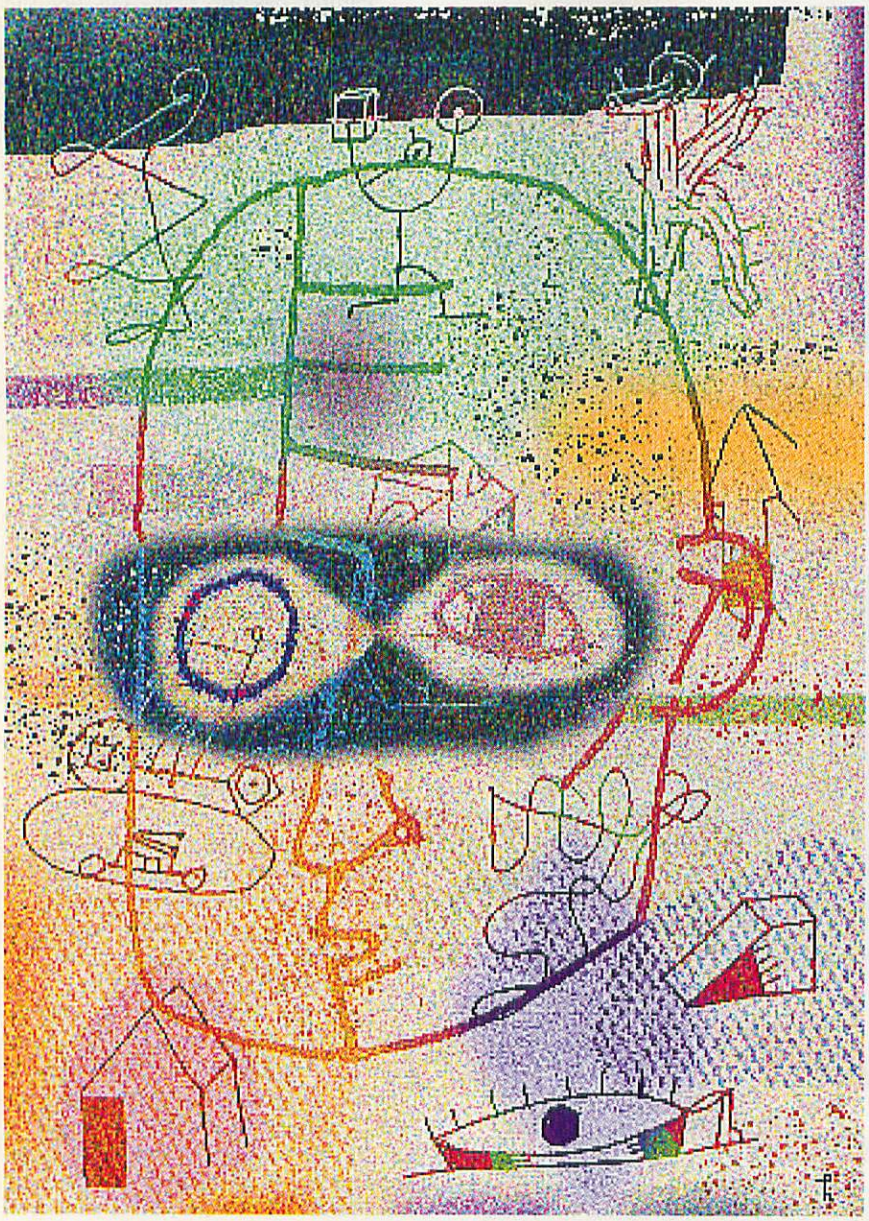
In the case of PixelPaint Pro, you import a texture file into the current painting's mask layer (see "Paper Mask"). You then activate the mask and draw over it. The white areas of the mask let you apply color to the painting, the black areas of the mask protect the painting from color, and the gray areas allow you to apply transparent paint. Therefore, a textured mask that looks like a series of softened hatch marks produces the effect of drawing on a clothlike surface with a woven pattern.

Painter takes the opposite tack. Rather than applying texture to a painting as you draw, you apply the texture retroactively (see "Retroactive Texture"). After selecting one of 22 paper surfaces, you in effect project light onto the surface of the page and instruct Painter to calculate the locations and colors of

shadows and highlights. You can then alter the saturation of colors on the page to heighten the appearance of ink applied to the newly textured surface.

Other programs provide filters to enhance the appearance of an artwork. Most color paint programs have filters that sharpen or blur an image. As with surface textures, you can use filters to mimic a traditional element. For example, applying SuperPaint's Mosaic filter—an Aldus Gallery Effects sample provided with the program—to an area of a painting creates the effect that the area has been projected onto a wall of different-size tiles.

One program that offers a unique approach to filters is Delta Tao Software's Monet. In fact, Monet is nothing more than a filtering application. After loading a painting or photographic scan created in another application, you use Monet's tools to alter the image's appearance by altering the pattern of colors. One tool changes the painting so it looks as if it were viewed through uneven, refractive glass; another fills the image with brush marks, transforming a photograph into a work of neo-impressionism. Because each effect is supplied as a tool, you can apply multiple transformations to specific areas of a painting, creating a collage of filters and textures.



The Swiss artist Paul Klee would experiment with textures of both the canvas and the paints, often combining several textures to give his work an almost tactile dimension. Artist John Hersey used the masking tools in MicroFrontier's Color It to achieve the same effects. "It was easy to make fortuitous mistakes, to try avenues for experimentation, which is a hallmark of Klee's style," he said.

But What Good Are They?

ALL NICE AND WELL, YOU SAY, BUT what do I need with a paint program? Although the tasks a paint program can accomplish are less obvious than those associated with other categories of software (such as page-layout programs and word processors), paint programs can handle a wide range of jobs. For example, all color paint programs can output black-and-white composite prints, which are perfect for representing color screen shots, photographic embellishments, or original artwork.

Another example is that by using the antialias filters in programs such as MicroFrontier's Color It, PixelPaint Professional, and Studio/32, you can integrate antialiased text and lines into figures and schematic artwork. At high enough resolutions—say, 200 dots per inch—halftone (bitmap) paintings are largely indistinguishable from the object-oriented artwork associated with Claris's MacDraw or Adobe Illustrator, even when printed to a high-resolution imagesetter. In fact, the idea that paintings necessarily contain jagged lines is passé in light of color paint programs with antialias control.

But let's face it, the world is showing signs of relying less on printed media and more on visual media like videotape and screen presentations. For years paint programs have striven to overcome the differences between on-screen representation and actual printed output. But the increased reliance on screen-based images means artists can now create their work in the medium in which it will be presented. This shift to screen-based media is a homecoming for artists, since the screen is a paint program's native medium. Whether for slides, presentation graphics, videotape, start-up screens, disk-based training guides, or CD ROMs, color paint programs are perfectly suited for use in visual media.

In your off time, you can use a painting to enhance the appearance of your Macintosh interface. Aldus SuperPaint, Deneba Software's Canvas, and SuperMac's PixelPaint 2.1 each support the Macintosh color start-up screen format. When located in the System Folder, an image saved in this format replaces the "Welcome to Macintosh" message that displays when you turn on the computer. If you have a sufficient amount of free RAM, you can use a utility like ColorDesk from Microseeds Publishing (sold as part of Screen Gems) to display a color painting over the Finder desktop pattern.

The Whole Paint Catalog

IN 1984, THE PAINT FIELD BELONGED to MacPaint. Eight years later, the num-

ber of paint programs has swelled to 17. I'm not counting at least 10 programs that you may have heard of, or that you may even own, that have since fallen by the wayside—including FullPaint, Photon Paint, CA-Cricket Paint, Modern Artist, and PaintWorks. I'm just counting current, shipping products, both black-and-white and color.

Here they are—every one of them. To make the list a little more manageable, I have divided the paint programs into four categories. Each category has a brief introduction, so you can see at a glance (or a couple of glances anyway) whether to summarily dismiss a category of software or to take a closer look. They're presented in order of broad usefulness, from low to high.

Black and White: Still a Niche

IF YOU USE A COMPACT MAC SUCH AS A Plus or Classic, or a portable computer like one of the new PowerBooks, you have no access to color. (The one exception is the SE/30, which can be outfitted with a special board to support an 8-bit color monitor.) With a compact Mac, most color paint programs are not an option. Except for Canvas, Zedcor's DeskPaint, and SuperPaint—which work in black and white as readily as they work in color—you can ignore all paint applications except the three presented below.

These black-and-white-only programs lack the pizzazz and the flash of color programs. But they're serviceable for creating an occasional graphic or editing a screen shot, and they require very little memory to operate.

MacPaint 2.0 Minimum requirements: Mac 512KE; 500K of RAM. Recommended: Hard drive. Notes: Not 32-bit clean. Claris Corporation, $125.

By today's standards, the original black-and-white paint program is a real dog—and that's coming from someone who still uses the program religiously (but only because Amazing Paint doesn't work under 32-bit addressing). MacPaint offers few capabilities beyond what it offered eight years ago: it won't let you create an image larger than 8 by 10 inches, it supports only one graphic format (the MacPaint format), and it's painfully slow on a color monitor. MacPaint's merits number only two: it is easy to use and it takes up very little space in RAM.

Amazing Paint 1.01 Minimum requirements: Mac 512KE; 500K of RAM. Notes: Not 32-bit clean. CE Software, $99.95.

Amazing Paint is what MacPaint ought to be. It remedies all the drawbacks I mentioned above, including supporting the PICT format and letting you create images larger than 8 by 10. It also offers type sizes larger than 48-point in 1-point increments, a variable-size eraser, an airbrush that paints continuously, and free rotation, all of which are missing from MacPaint. All in all, Amazing Paint is an adequate black-and-white paint program for occasional work under low memory conditions.

Studio/1 1.0 Minimum requirements: Mac Plus; 1MB of RAM. Notes: Incompatible with System 7's virtual memory; not 32-bit clean. Electronic Arts, $79.

If Amazing Paint is adequate, Studio/1 is exceptional. In addition to having better painting tools and transformation effects than its black-and-white rivals, Studio/1 offers an object-oriented type layer for creating high-resolution text. But what puts this program over the edge are its animation capabilities.

Not only can you draw images frame by frame and link them together, but you can also move, resize, and rotate a selected bitmap through a specified number of frames to simulate three-dimensional motion. A bundled XCMD lets HyperCard play the finished sequences. Still, if you don't need animation and you don't care about high-resolution text, Studio/1 may prove too bulky to fit the bill; it needs at least 1MB of RAM, twice as much as with either MacPaint or Amazing Paint. But 1MB is not much to ask for on a Mac today.

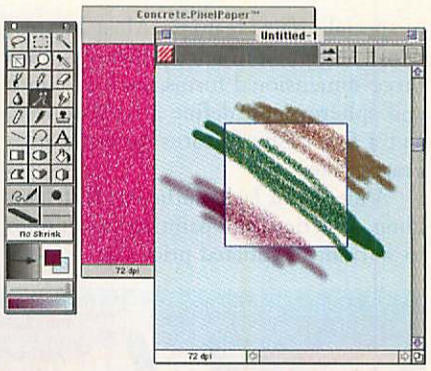
8-Bit Color: For On-Screen Art

COLOR PAINT PROGRAMS FALL INTO two camps: 8-bit programs, which let you display 256 colors at a time, and 24-bit programs, which let you exploit a 16 million–color spectrum. It's tempting to assign a program to the 8-bit or 24-bit category based on a user's monitor limitations. But while an 8-bit program is clearly inadequate for a 24-bit user, a 24-bit program is frequently the better choice for an 8-bit user, especially when you consider that three 24-bit programs are less expensive than any of those described in the 8-bit category.

In fact, the only reason to use an 8-bit program is to create an image that you only want to display on screen. The 8-bit program constrains your palette so you can easily avoid the dithered colors that frequently result when you use a 24-bit program on an 8-bit machine.

VideoPaint 1.1a Minimum requirements: Mac II or LC; 2MB of RAM. Notes: Not 32-bit clean. Olduvai, $495.

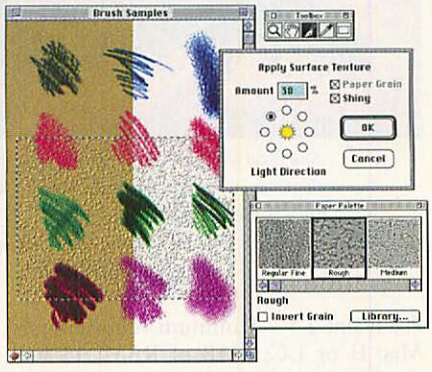
VideoPaint offers a distinctive array



Paper Mask In PixelPaint Professional, one of nine surface textures may be imported into a painting as a mask (in this case concrete, as shown in the background window). I have drawn a rectangular border around the textured area of the mask so you can compare how tools react to painting over a textured surface and a smooth surface.



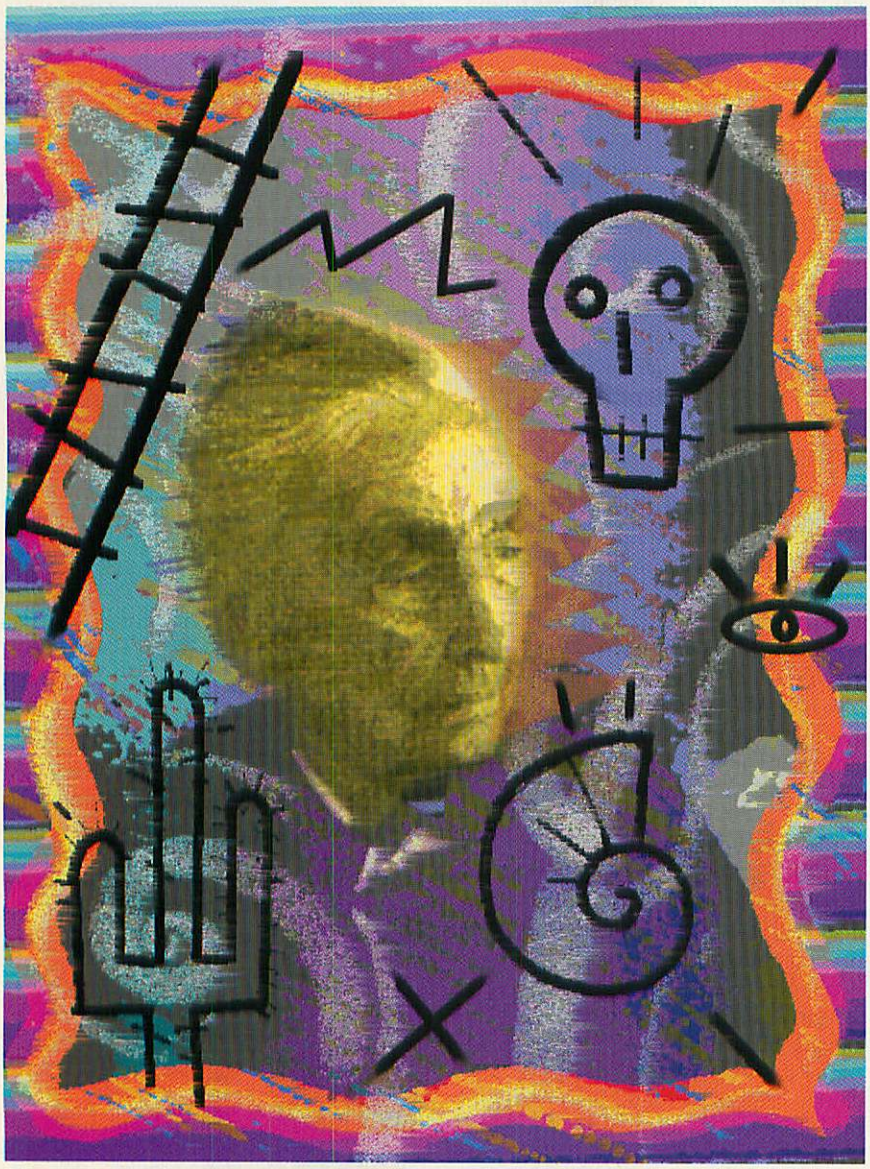
Everything Old Is New Again Fractal Design Painter provides a variety of brush tools that emulate real painting tools. The top row of lines was drawn using three kinds of pencils; the second row was drawn with three types of chalk; the third row demonstrates felt-tipped pens; and the last row shows the effect of crayon and charcoal tools. All tools may be customized using the Variant and Method pop-up menus in the Brush Palette window (upper right).



Retroactive Texture In Fractal Design Painter, one of 22 surface textures may be applied to a selected area. Using the Apply Surface Texture dialog box, you determine the angle at which light is projected onto the surface texture. You may also specify whether highlights or shadows are applied using the Shiny check box.

of special-effects features. Most impressive, you can wrap selected images onto three-dimensional forms, such as cones and spheres, and define a light source. But a few flashy features do not a program make.

VideoPaint lacks sufficient text-handling, selection, and painting capabilities to warrant its inflated price tag.



American artist Georgia O'Keeffe is best known for her sensuous floral studies, but her work encompasses a much wider range. Still, texture, curvature, and flow are common to her work. Artist Steve Lyons used Time Arts' Oasis, which works with pressure-sensitive tablets and offers the fine control needed over paint "wetness" and opacity and over stroke width, to evoke some of O'Keeffe's themes and add his own touches.

PixelPaint 2.1 Minimum requirements: Mac II or LC; 1MB of RAM; 13-inch display. SuperMac Technology, $249.

Previous versions of this program were the kings of the color paint heap. While this is no longer the case, PixelPaint remains a serviceable program. Although the program lacks VideoPaint's transformation capabilities, PixelPaint offers better painting tools, including an airbrush tool that can paint continuously and has a special splatter control, letting you mimic real-life spray paint and graffiti techniques. PixelPaint also provides the best printing controls of the 8-bit bunch, including the ability to create color separations and control the shape of halftone dots.

Studio/8 2.0 Minimum requirements: Mac II; 2MB of RAM. Notes: Incompatible with System 7.0's virtual memory; not 32-bit clean. Electronic Arts, $295.

The best of the 8-bit programs has got to be Studio/8. It outpaints PixelPaint, provides special effects that rival those offered by VideoPaint, and has selection capabilities that neither program can match, letting you select images by dragging around them, dragging inside them, or a combination of the two applied retroactively. Studio/8 also provides special palette-editing features that let you precisely control the 256 colors available in the painting. In fact, this palette control is the one feature that the 8-bit programs can claim over their otherwise superior 24-bit counterparts.

24-Bit Color: The Epitome of Paint

THE 24-BIT PROGRAMS ARE THE EPITome of both the high end and the low end of bitmap technology.

At the low end, 24-bit programs are among the least expensive software for the Mac. You get a program that runs on a gray-scale or color, 8-bit or 24-bit monitor (only black-and-white monitors are forbidden) and suffices for creating bitmapped images from scratch or editing scanned artwork or photos. Where else can you get that kind of value?

At the high end, 24-bit programs emulate real-life painting techniques and provide the best freehand drawing of any graphics programs. Many are overpriced, but they never fail to amaze.

Color MacCheese 2.0.8 Minimum requirements: SE/30; 1MB of RAM. Delta Tao Software, $99.95.

Color MacCheese is billed as the 24-bit paint program for the starving artist. Certainly, it's the least expensive color program—it's the same price as the black-and-white Amazing Paint. But despite its low price, Color MacCheese offers most of the 24-bit painting necessities, including antialiased text, transparency control, and support for the major Macintosh graphics file formats. In fact, Color MacCheese is such a good deal that in my 1991 paint program roundup, I nominated it as the best paint program in the $100 range. Although this recommendation goes to Color It this year, Color MacCheese remains a fine entry-level program for the beginning artist, student, or any user who has recently upgraded to a color machine.

Color It 1.0 Minimum requirements: SE/30; 2MB of RAM. Notes: Built-in virtual memory. MicroFrontier, $119.95.

Although it costs $20 more than Color MacCheese, Color It returns the additional investment by providing several features that Color MacCheese lacks. Besides offering support for System 7 enhancements such as balloon help and publish and subscribe, Color It provides an antialiased paintbrush tool for drawing smooth lines, a magic-wand tool for selecting areas of contiguous color,

built-in virtual memory to let you open images that require more memory than is available in RAM, and the ability to open and save Photoshop files—all missing from Color MacCheese. Without a doubt, Color It is the best color paint program in the $100 range.

DeskPaint 3.07 Minimum requirements: Mac Plus; 2MB of RAM. Zedcor, $199.95. (Sold with DeskDraw 3.07.)

Back when DeskPaint was a black-and-white program, I relied on it almost daily. But now that it's grown into a color program, I have very little use for it. It is neither as powerful nor as inexpensive as Color It, and it pales by comparison with the more expensive programs. But unlike any other 24-bit program, it can create black-and-white graphics and will run on a black-and-white machine, making it the most versatile of the 24-bit bunch—if otherwise unremarkable.

Monet 1.0 Minimum requirements: SE/30; 2MB of RAM; System 7. Delta Tao Software, $399.

Technically speaking, Monet isn't a paint program because you can't use it to create images. Instead, it lets you apply special color patterning effects to an image created in some other color paint program or captured using a scanner. The patterning tools supposedly produce the effect of nineteenth-century impressionist artwork. Mostly, though, they just muck up a picture until you have to squint at it to tell what it is. From a marketing standpoint, I guess you can look at Monet as a paint program for nonartists—sort of like those kits you'd get as a child in which you whittled away a soft plastic exterior until you arrived at the hard plastic statue inside. It's a diverting toy, but I can't imagine an adult finding it entertaining for more than a few minutes. And I can't imagine anyone—adult or child—spending $400 on it.

PixelPaint Professional 2.0.1 Minimum requirements: Mac II; 1MB of RAM. Recommended: Hard drive. Notes: Pressure-sensitive; built-in virtual memory. SuperMac Technology, $799.

Just last year I was recommending PixelPaint Pro 1.0 as the best of all paint programs. Then version 2.0.1 arrived and burst my bubble. Or perhaps it's just that other programs have become better as PixelPaint Pro has become clumsier and slower. While it continues to provide better color-separation capabilities than any of its competitors, PixelPaint Pro is bettered or equaled by at least one other paint program in every other aspect. If you're looking for a pure painting experience, both Oasis and Fractal Design Painter offer more versatile support for the Wacom tablet, and Painter provides a more extensive range of painting tools. If you value the ability to select and manipulate images, Studio/32 provides the most comprehensive set of selection tools as well as the quickest and most precise transformation capabilities. If you're a fan of image-editing filters, Oasis provides impressive filters that can be previewed, and Painter matches PixelPaint Pro's support for Photoshop-compatible filters at half the price. Don't get me wrong, PixelPaint Pro remains a quality paint program, but it has sunk from reigning king to more of an overpriced, overburdened jack-of-all-trades.

Oasis 1.0 Minimum requirements: Mac II; 5MB of RAM. Notes: Pressure-sensitive. Time Arts, $795.

Oasis is a painter's program. Unlike the overwhelming majority of its competitors, Oasis lacks transformation capabilities: you can't scale, rotate, or slant a selection, or apply any special effects. Instead, Oasis concentrates on pressure-sensitive painting. In most pressure-sensitive programs, the pressure of a pen stroke affects only the size of the tool. In Oasis, you can direct the pressure to affect the tool size, ink density, ink color, or a combination of the three. Oasis also offers a variety of sophisticated image-editing filters, each of which can be previewed before it is applied. However, with no magnification control for changing view sizes, slow tool tracking, and a sometimes buggy interface that includes a cumbersome Undo command and a badly implemented cloning function, Oasis doesn't justify its $800 price tag. (Version 1.1 was scheduled to ship as this issue went to press.)

Studio/32 1.2 Minimum requirements: Mac II; 5MB of RAM. Notes: Pressure sensitive; built-in virtual memory. Electronic Arts, $695.

Studio/32 is perhaps the most well rounded of paint programs. Although it lacks PixelPaint Pro's printing capabilities, Studio/32's painting features are remarkable and its selection and transformation features are the best available. In addition, Studio/32 offers a separate text layer for creating object-oriented text. But now that 24-bit programs like Color It and Painter offer sophisticated bitmap-creation capabilities for under $300, the days of $700 paint programs may be coming to an end. In this light, PixelPaint Pro is overpriced, Oasis is overpriced, and Studio/32 is no exception.

Fractal Design Painter 1.0 Minimum requirements: Mac II; 2.5MB of RAM; hard drive. Notes: Pressure sensitive; built-in virtual memory. Fractal Design Corporation, $299.

Like Oasis, Fractal Design Painter is a paint-only program. It doesn't provide any transformation capabilities, and although it offers support for external Photoshop filters, it provides no filters of its own. Painter doesn't even provide a text tool. But combined with a Wacom pressure-sensitive tablet, Painter offers the best real-life emulation capabilities of any paint program, including a wide range of tools from crayons to felt-tip markers to Japanese paintbrushes, all of which work exactly as you'd expect. Add the fact that any tool can be thoroughly customized, and you've got a better-than-real-life scenario. Finally, at any stage in creating a painting, you can select an area and apply one of 22 paper surfaces to it, specify the light source and the reflectivity of the paper, and adjust the concentration of existing paint strokes with respect to the paper texture. If you're an artist, the bottom line is that you need Fractal Design Painter.

MW EDITORS' CHOICE

Black-and-White Paint

Studio/1 With the most features in the black-and-white market, Studio/1 is easily the best package in this niche. Its only drawback is that it is incompatible with virtual memory. **Company:** Electronic Arts. **List price:** $79.

8-Bit Color Paint

Studio/8 Outshining its competitors in all respects, Studio/8 includes special effects, selection tools, and palette editing. Its sole flaw is its lack of support for virtual memory, which allows the creation of large, detailed images. **Company:** Electronic Arts. **List price:** $295.

Paint-and-Edit 24-Bit Color Paint

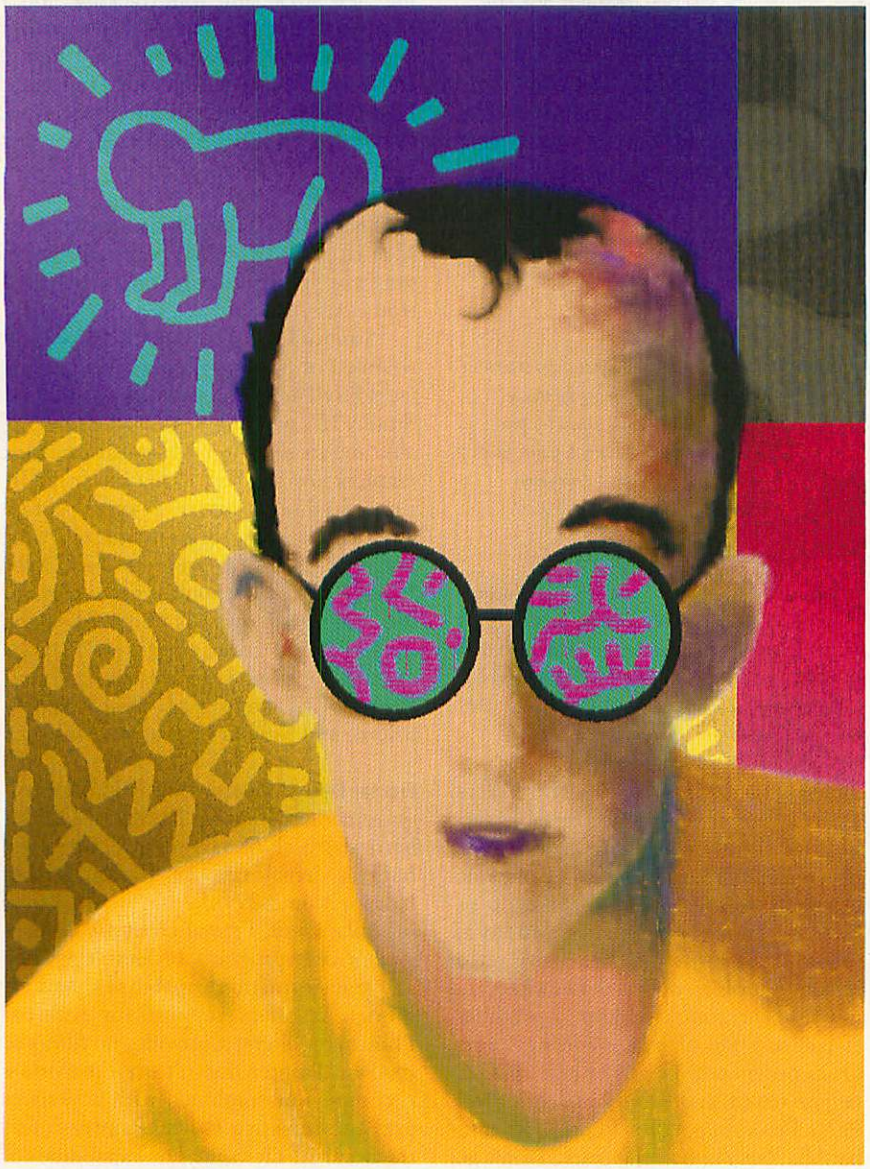
Color It A host of special editing and selection tools, coupled with support for many System 7 features and support for the Adobe Photoshop file format, make Color It a clear winner in its class. **Company:** MicroFrontier. **List price:** $119.95.

Paint-Only 24-Bit Color Paint

Fractal Design Painter With the best real-life emulation capabilities of any paint program, as well as full user-customization of its tools, Painter is a must for any professional artist. **Company:** Fractal Design Corporation. **List price:** $299.

Half Paint, Half Draw

THESE FINAL PROGRAMS CROSS THE line that separates bitmap paint programs from smooth-line drawing programs. All three programs let you merge object-oriented text, polygons, and freehand curves with painterly effects. While none rivals a program like Studio/8 in the 8-bit category or Color It in the 24-bit category, these programs all are sufficient for occasional paint jobs.



American artist Keith Haring's work is dynamic and simple, relying on simple shapes and lines common to urban graffiti, which was Haring's inspiration. Artist Dale Horstman used SuperMac Technology's PixelPaint Professional to emulate Haring's work, although the program's slow speed often made it difficult to keep the dynamism and immediate feedback of traditional brushes.

Canvas 3.0 Minimum requirements: Mac Plus; hard drive. Recommended: 2MB of RAM. Notes: 24-bit color. Deneba Software, $399.

Canvas 3.0 doubles as an amazing draw program and an adequate paint program. Although it supports black-and-white, 8-bit color, and 24-bit color monitors, it offers no more than the minimum collection of painting tools offered by MacPaint. To be fair, however, Canvas isn't aimed at painters. So it simply isn't equipped to compete with UltraPaint or SuperPaint in this arena. But the program does provide multiple painting layers for overlapping bitmap and smooth-line images, and it's equally useful for creating black-and-white and color artwork.

UltraPaint 1.05 Minimum requirements: Mac Plus; 1MB of RAM. Notes: Pressure-sensitive; 8-bit color. Deneba Software, $199.

You can look at UltraPaint as the least expensive of the 8-bit paint programs or as the least powerful of the paint/draw programs. Either way, UltraPaint fails to impress. Although it offers a small assortment of real-life emulators including a chalk tool, a charcoal tool, and a quill-tip pen, UltraPaint provides none of the special printing capabilities offered by PixelPaint 2.1, it has none of the new texture capabilities found in SuperPaint, and it pales as a draw program when compared to Canvas.

Aldus SuperPaint 3.0 Minimum requirements: Mac SE/30; 2MB of RAM. Notes: Pressure-sensitive; built-in virtual memory; 24-bit color. Silicon Beach Software, $199.

Of the three paint/draw programs, SuperPaint is the best paint application, although I'm not sure that's saying much. Although it lacks any antialiasing capability and it supplies only one tool that works with a pressure-sensitive tablet, SuperPaint provides a decent collection of painting and special-effects tools, as well as a handful of image-editing features, including a Mosaic sampler from Aldus Gallery Effects (sold separately). SuperPaint also provides a new feature called Textures, with which you can save selected bitmapped or object-oriented images to disk and use them to fill other objects. In any other program, this feature would be called custom patterns. The small collection of predominantly 2-D patterns provided with SuperPaint emulate 3-D textures, but there's no guarantee that ones you create will emulate them.

A Palette of Options

THERE'S HOPE THAT THE MOST professional of paint programs may be coming down in price. Although PixelPaint Pro, Studio/32, and Oasis continue to hover between $700 and $800, the new, top-notch Fractal Design Painter retails for about $300. Less capable but equally fun programs like Color It and Color MacCheese list for about $100.

At these prices, you can get a couple of programs whose combined strengths surpass those of the more established programs—for the cost of one of the more traditional programs. Next thing you know, you'll have a whole palette of paint programs to choose from. ■

See *Where to Buy* for contact information.

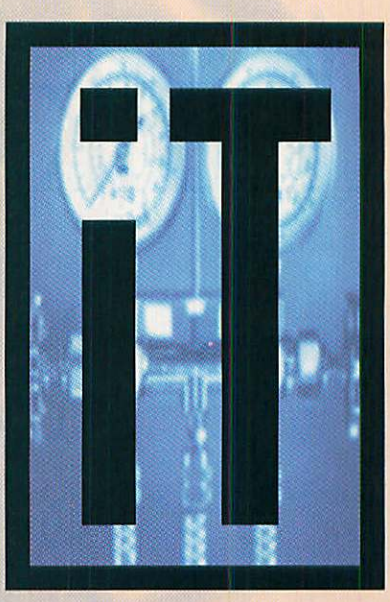
DEKE McCLELLAND has written far too many books on draw and paint packages, including *Painting on the Macintosh* (Business One Irwin, 1989). He and coauthor Craig Danuloff are updating their best-selling *Encyclopedia Macintosh* (Sybex, 1989).

Images & Tools is a two-day event sponsored by *Macworld* magazine. You will learn firsthand from well-known computer-graphics artists and designers how they do what they do. They'll demonstrate the techniques they use to create high-quality electronic art, and they'll showcase the tools (from Aldus FreeHand to Adobe Photoshop) that help them do it.

Invited speakers will take you through the creative process in their areas of expertise, from concept to finished piece, and then open the floor to questions. **Jim Ludtke** is a graphic designer and 3-D animator who began his career as an airbrush artist. **Ron Chan**, formerly with the *San Francisco Chronicle*, illustrates for advertising agencies, design firms, and magazines. **Arne Hurty**, senior designer/informational graphics at *Macworld*, was the winner of the first Aldus FreeHand illustration contest, published in *Print* magazine. **John Hersey** is an illustrator whose work has appeared in *Esquire*, *GQ*, *LA Style*, and the *Washington Post*. **Erik Adigard**, who studied fine arts in France, came to computer illustration through his experience in video animation. **Sanjay Sakhuja** is president of Digital Pre-Press International, a PostScript-based, state-of-the-art color-separation house. **John Knoll**, one of the creators of Adobe Photoshop, currently works for Industrial Light & Magic.

Conference registration is $495 and includes all sessions, conference materials, breaks, and luncheons. Checks must be made payable to Macworld Communications and sent to: Sandy Butler, Events Manager, Macworld Communications, 501 Second St., Suite 500, San Francisco, CA 94107.

For additional information contact the Events and Conferences department; 415/267.1745; fax 415/442.0766.



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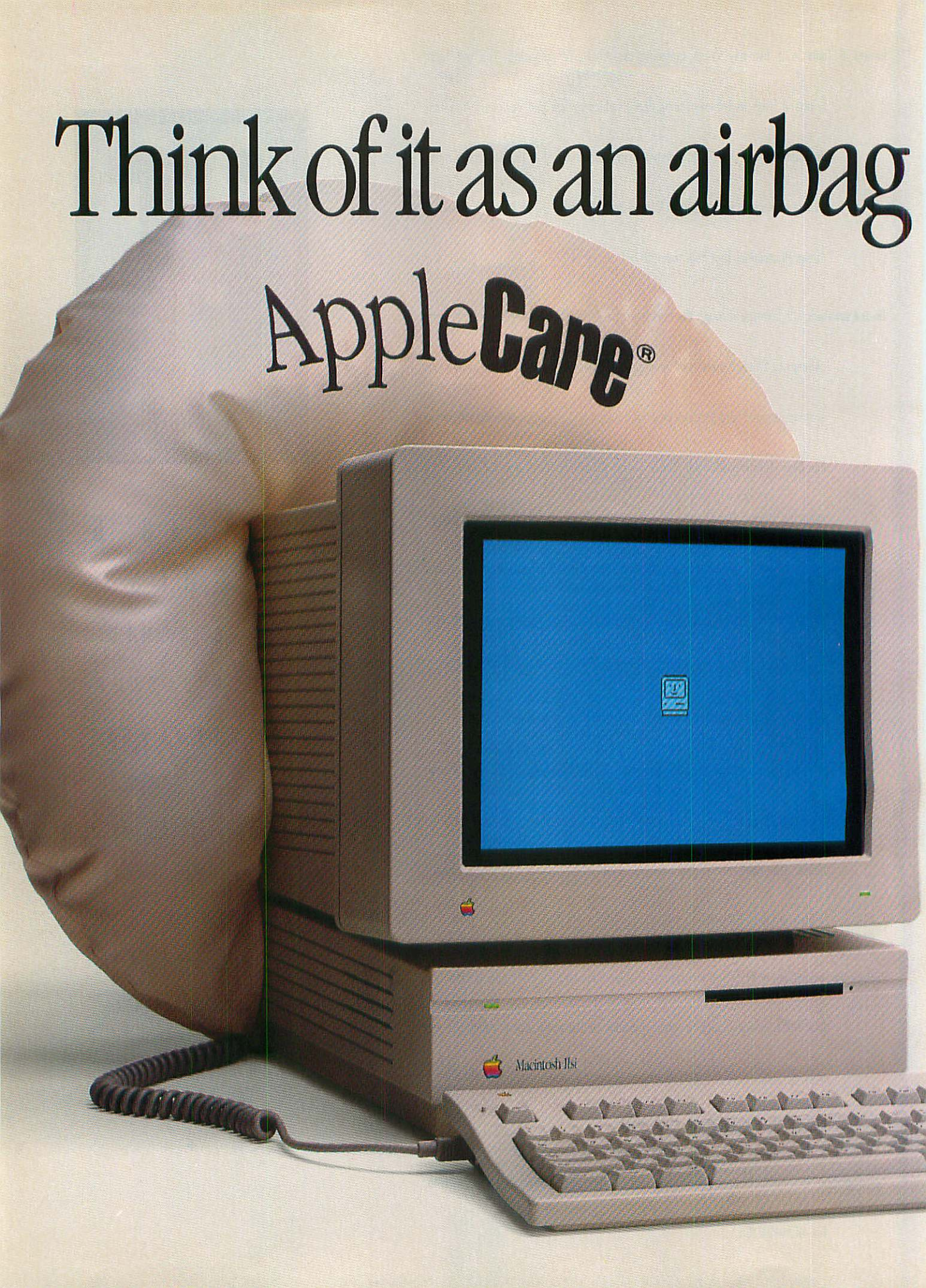
HOTEL,

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Think of it as an airbag

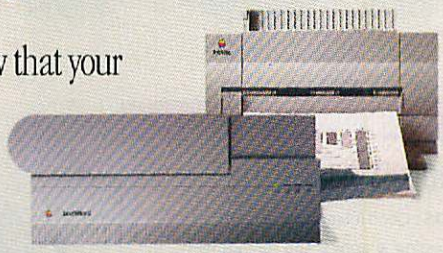
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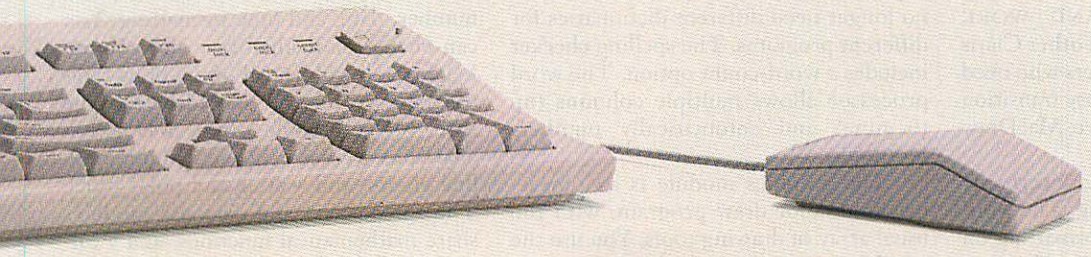
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Reviews

IN THIS ISSUE: ClarisWorks, ColorStudio, ModelShop II, Aldus SuperPaint, FrameMaker, The Compete Half-Page Scanner/GS, ScanMan Model 32, and more

Integrated Software

ClarisWorks 1.0

PROS: Good integration of word processing, graphics, and spreadsheet modules; compact size and memory use. **CONS:** No file translators for other Claris products; bare-bones communications module. **COMPANY:** Claris Corporation (408/ 727-8227). **REQUIRES:** Mac Plus; System 6.0.5; hard drive. **LIST PRICE:** $299.



ROGER MASTROIANNI

Mike Gordon of Domino's Pizza in Ann Arbor, Michigan, tests ClarisWorks on a Macintosh Portable to track invoices, shipping routes, log books, and so on.

AFTER YEARS OF MARKET DOMination, Microsoft Works has some new competition for its integrated software users. Symantec was the first to up the ante against Microsoft with GreatWorks (*Reviews*, *Macworld*, January 1992), and now Claris's ClarisWorks offers better integration than either of its predecessors.

ClarisWorks offers five applications: a word processor, graphics, a spreadsheet with charts, a database, and communications. Integration among the first three of these applications is accomplished by placing *frames* from any of the other modules into a document. The database module is easy to use with the word processor for mail merge, but otherwise is not integrated. The communications module is not integrated with the rest of the program.

Function without Frills

THE MODULES LOOK AND WORK like less-powerful versions of other Claris products. The idea is that users who need more features can make an easy transition to MacWrite II, Claris Resolve, MacDraw Pro, or FileMaker Pro.

The individual modules are certainly adequate, but not outstanding. The word processor bases paragraph formatting on rulers, in which you set tabs, justification, line spacing, and margins. To change the format, you modify the ruler. You can copy ruler settings from one paragraph to another, but you can't name or use rulers in another document. ClarisWorks provides a spelling checker (with main and user dictionaries) and a thesaurus, which you can use in any of the modules except communications. You can also use this spelling checker–thesaurus system with any of Claris's other products, so you no longer need different dictionaries for different programs. The spelling checker includes a word-count option. The word processor allows multiple columns (up to nine) and automatically numbers footnotes.

The graphics module is an object-oriented color draw program, with the usual array of drawing tools. You use the graphics module to create documents such as newsletters, where you need different column structures on the same page. You do this by drawing text frames on the graphics layout. Text frames can be linked so that text flows between frames. You can't, however, wrap text around a graphic object; text must be in rectangular frames.

The spreadsheet module offers a fair selection of features, including cell-by-cell text formatting; cell borders; and number, date, and time formatting. You can change individual row and column heights and widths. All of the draw tools can be used in your spreadsheets. The spreadsheet module offers 3-D graph charts, as well as 2-D pie, column, and line charts, and scatter and polar plots. The spreadsheet and database modules share mathematical functions, and a calculation can trigger a ClarisWorks macro.

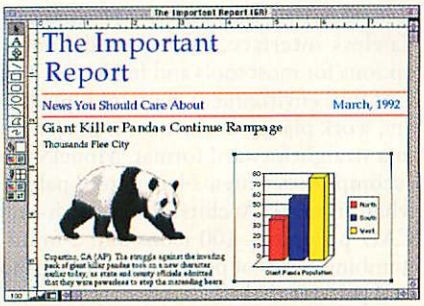
The disk-based database is reminiscent of early versions of FileMaker, with a few improvements. You can have any number of named data layouts, and you switch layouts via a menu choice. The database does not include repeating fields, and it is missing a graphics field type, which FileMaker Pro has.

As is almost traditional with integrated packages, the communications module is the neglected stepchild. Based on the Apple Communications Toolbox, which is built into System 7 and is installed with ClarisWorks on Macs using System 6, the module allows each communications function to be a separate, plug-in software module, or tool. The basic set of tools of the communications module includes TTY and VT102 terminal emulation and Xmodem file transfers. Most software manufacturers add more functions simply by shipping more tools—but Claris hasn't done that, with the result that the communications module is the least polished part of ClarisWorks. Claris should add more file-transfer protocols, such as Ymodem, Zmodem, and Kermit, and create a decent scripting interface for automated log-on and other repetitive actions. Although you can use the macro facility for limited automation, it is inadequate. Microsoft Works and GreatWorks also have weak, bare-bones communications modules.

Right Mix

THE INTEGRATED APPLICATIONS share a common tool bar, which can be hidden. The tool bar includes icons for the graphics, word processor, and spreadsheet modules as well as the usual drawing tools, with palettes for color pens, patterns, and fills. The tear-off palettes can be placed anywhere on the screen.

You add frames to a document from other modules by selecting one of the module icons from the tool bar and drawing the frame in the current document. (This works only between the word processor, graphics, and spreadsheets modules.) For example, to add a spreadsheet frame to a report, you simply select the spreadsheet tool and draw the frame in the text document. You can then enter figures and formulas into the new spreadsheet frame. Using frames makes it easy and fast to create documents that include text, graphics, charts, and numbers.



The Important Report Based on a graphics document, text frames were added and positioned. The panda is an imported EPS file, and the 3-D chart was created using the spreadsheet module, then sized to fit. The rules were added last, with the graphics tools.

ClarisWorks uses the XTND file-translation technology. Although you can import and export files in a wide range of text and graphics formats, there are no direct translators for some of the other Claris programs, such as FileMaker Pro, MacDraw Pro, and Claris Resolve. Intermediate formats such as PICT and SYLK work for translation, but it's odd that ClarisWorks can't handle its own program's native files. Some XTND translators also work in only one direction; they import, but don't export, in some file formats (such as Acta 3.0).

ClarisWorks' documentation is excellent. It includes a HyperCard-based tour, a tutorial, a reference manual, a good contextual online help file, and a separate handbook on communications. There's also an excellent quick-reference guide with all the command keyboard equivalents, plus short explanations for common operations in each of the program's environments. Claris's technical support, which requires a toll call, was easy to reach, but the staff was clearly still getting up to speed on the product. Tech support is also available via fax, CompuServe, America Online, and AppleLink.

Surprisingly, ClarisWorks does not support System 7's publish and subscribe or AppleEvents (it does have balloon help, though).

Which Works?

WHEN COMPARED WITH MICROSOFT Works 2.0, ClarisWorks is the clear winner. Pitted against Symantec's GreatWorks, ClarisWorks still comes out on top with its easy, frame-based integration. GreatWorks has two modules that ClarisWorks doesn't have—outlining and painting—and while I don't miss the paint features, an outliner would be a welcome addition.

ClarisWorks' small size (564K without dictionaries and translators) and relatively small (900K) RAM requirements make it a good choice for portable-Mac users. It's also a good choice for people who don't need full-power applications and for those on a budget. ClarisWorks is a strong product that is closer to a truly integrated product than any of its competitors.—TOM NEGRINO

Photo-Editing Program

ColorStudio 1.5

PROS: New Shapes tools; new modeling filters; supports external Photoshop filters and imports Photoshop format; CMYK color editing; direct scanner and prepress support. **CONS:** No sample texture masks; many filters applicable to rectangular selections only; dense interface; inadequate feathering. **COMPANY:** Letraset USA (201/845-6100). **REQUIRES:** Mac II; 5MB of RAM; color monitor; hard drive. Recommended: 24-bit video board. **LIST PRICE:** $995.

COLORSTUDIO NOW DOES WHAT it should have done a year ago. I doubt it will overtake Photoshop, but it seems determined to at least keep up. In addition to making the automatic selection tool available from the toolbox, ColorStudio 1.5 adds two new fully customizable image-editing tools: an eraser and an eyedropper. The eraser can change size and be pressure-sensitive. More remarkably, the eyedropper can duplicate a specific color or average an isolated area of neighboring colors. The eyedropper can also average a free-form range of colors.

The built-in Shapes module adds seven tools for drawing complicated smooth-line effects, comparable to those you might create in Adobe Illustrator. In fact, the Shapes tools compete effectively with combined draw and paint applications such as Canvas. Most notably, the Shapes tools include a Bézier-curve tool, a text tool, and a geometry tool that can be used to create any shape, from a circle to a regular polygon to a star. The text tool lets you not only convert text into editable paths that can be reshaped, as in Illustrator or Canvas, but also access special characters that have no keyboard equivalents. With the advent of TrueType, Apple has expanded the character set to exceed the 256 characters accessible from the keyboard. (Did you know that the TrueType versions of Chicago, Geneva, Monaco, and New York include fractions, math symbols, and special characters like the Old English and Icelandic *edh*, none of which can be accessed using Key Caps?) Adobe PostScript fonts have offered these characters (though they are missing from the bitmap screen fonts), yet neither Illustrator nor Photoshop provide a means to access them.

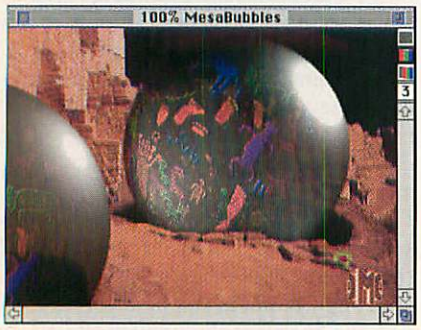
Filtering the Good from the Bad

COLORSTUDIO'S FILTERS ARE MORE numerous and more varied than those of

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any other photo-editing program. Its Blur and Sharpen filters are more sensitive than those included in Photoshop. And ColorStudio's Unsharp Mask filter (a prepress term for highlights and shadows applied to an image to enhance contrast and call out details) is the most flexible I've seen. ColorStudio 1.5 even adds a few modeling filters; the Spherize filter wraps a copied image around the surface of a sphere. Unlike sphere filters in other applications, Spherize lets you specify the angle and intensity of two light sources, giving the spheres a three-dimensional look.

But ColorStudio's filters also have limitations. Many of the filters—such as Ripples, which diffuses an image, and Relief, which etches a selection onto a textured surface—rely on the contents of the mask layer. While the manual shows how these effects can be implemented, ColorStudio lacks a texture mask. Without a texture, the filters are useless. (You can create a texture using a special Mask Texture filter, but it won't be as sophisticated as one resembling a rain puddle or a brick wall). More frustrating, many of the program's filters can be applied only to rectangular selections.



Spherical Spirits Using the Spherize filter, I wrapped wall paintings around spherical shapes and lit the spheres. I then copied the spheres, feathered the edges, and combined them with a scan of a kiva from Mesa Verde National Park. I made the spheres translucent using opacity and masking controls.

ColorStudio now supports plug-in, compatible Photoshop filters and can even import Photoshop files.

Full-Court Prepress

A COLOR CHANGE COMMAND ALLOWS you to sample colors within a selected area and apply the sampled range as a standard to color-correct other portions of the image. Better yet, the Color Correction window has been enhanced to accommodate brightness and contrast settings, curve-adjustment controls, and freehand curve alterations. Like Photoshop 2.0, ColorStudio 1.5 supports CMYK editing. ColorStudio can export to high-end prepress devices from Crosfield, Kodak, and Nikon. ColorStudio also supplies scanner drivers for most major color flatbed and slide scanners. ColorStudio's support for these devices is excellent. (Scanner drivers for Photoshop must be acquired from the scanner vendor.)

But all is not perfect. Perhaps worst, ColorStudio consumes a minimum of 5MB of hard drive space, more than twice the space Photoshop requires. It also takes longer to launch (21 seconds versus Photoshop's 13 seconds on a IIci), it has problems keeping up with fast brush-tool movements when painting thick lines, and the interface remains dense with options that can initially baffle. Do you know what it means to paint with "subtractive color"? Documentation comes in three separate books—the ColorStudio user guide, accurate up to version 1.11; the Shapes module user guide; and a version 1.5 addendum—each with its own index. The addendum acts as a key to the other two, but flipping back and forth is tedious.

ColorStudio also makes extensive use of balloon help. In fact, ColorStudio excels over any other bitmap application in on-screen help, color output, and object-oriented drawing effects. ColorStudio's masks are also more easily manipulated and better integrated with filtering commands and Clipboard functions. However, ColorStudio's free-form image-editing is disappointing. Applying handmade changes to selected images is more difficult in ColorStudio than in Photoshop, since selections act as localized masks in the latter. Also, you cannot adjust color balance and contrast settings within a selected area except by applying predetermined ColorTalk filters (or creating your own using complicated scripts). Finally, ColorStudio's feathering capability—in which the edges of a selection are blurred to create a softened appearance, similar to the Vaseline-on-a-lens technique used to film romantic close-ups—is less sophisticated than Photoshop's, producing a gummy effect that does not translate to the Clipboard unless the selection is first "floated" by clicking on it after completing the selection. Also, you cannot apply feathering retroactively, and you can't feather a selection that exceeds the borders of a document.

Overall, I prefer Photoshop for its straightforward interface and its masterful handling of necessary functions. Still, ColorStudio ranks a close second in both areas. And if your business involves color scanning and photographic output, ColorStudio may well prove the more satisfactory choice.—DEKE McCLELLAND

Architectural Modeling Program

ModelShop II 1.0

PROS: Easy, intuitive interface; versatile tools for creating, transforming, and visualizing objects; informative tutorial; simple animation for fly-by and drive-through views. **CONS:** Awkward manipulation of windows and openings. **COMPANY:** MacroMind/Paracomp (415/442-0200). **REQUIRES:** Mac SE/30; System 6.0.5. **LIST PRICE:** $895.

MODELSHOP II IS A 3-D MODeling program based on Paracomp's earlier ModelShop, which was a surface modeler. The revamped program has new tools and a new interface, and has been rewritten using painting and rendering algorithms that also add new features. ModelShop is not a CAD package, but rather a design and visualizing tool for architects. It generates polished and realistic views of modeled structures. To produce construction drawings, you need full-scale CAD.

ModelShop II uses conventional Macintosh drawing tools, along with a Bézier-curve tool and a lathe tool. The package also includes an extensive library of objects, mainly furnishings.

Making a Model

A MODEL IS A COMPOSITION OF 3-D objects acted on by environmental settings and viewing options. The selection of view affects what is visible when you draw objects, and the ease with which you can edit them. You can select preset axonometric, orthographic, and perspective views from a menu, or change your vantage point using tools from the tear-off tool palette. You can also save multiple views of a model and play them back using the PICS animation engine to simulate a drive-by or walk-through—with sound, if you like.

A Kinder, Gentler Interface

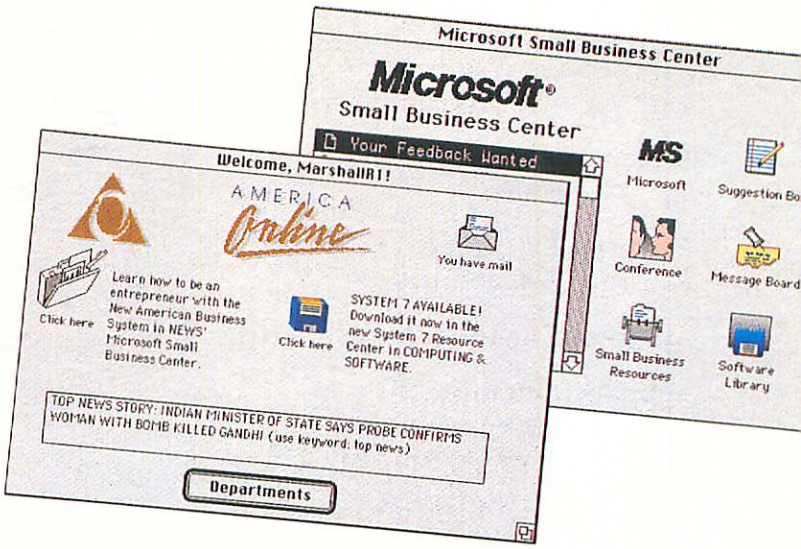
MODELSHOP PROVIDES AN ALMOST flawless interface, with user-definable options for most tools and functions. The CADlike environment, with multiple layers, work planes, and views, is presented in a straightforward format. ModelShop accomplishes with a 24-icon tool palette what it takes Architrion—a high-end CAD program—100 icons and a mind-numbing series of pull-down and pop-up tool palettes to do.

Nudging and Tweaking

MODELSHOP'S REAL ACCOMPLISHments are its modification tools, which

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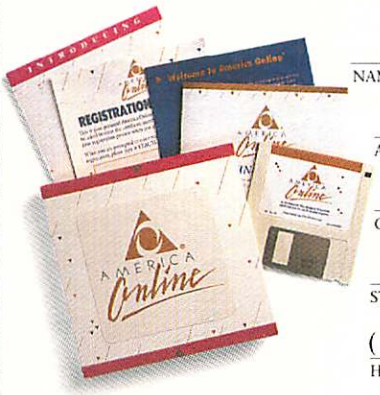
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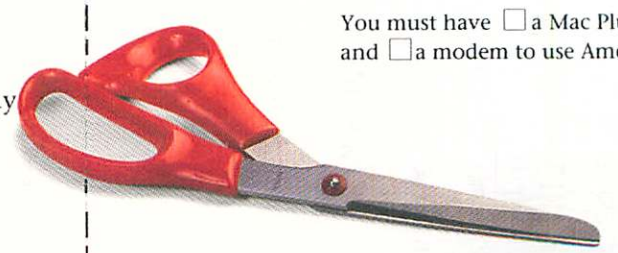
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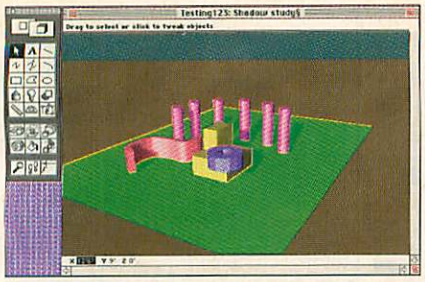
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Shadow Study Tear-away tool palettes allow you to create virtually any type of object. Objects can be moved and transformed in any view.

let you move, rotate, extrude, color, puncture, scale, and duplicate objects. But one of its shortcomings has to do with placing openings for doors and windows. You can't simply punch a hole through an object's side wall; you must draw the perimeter of the hole on the base plane, or bottom surface, and then extrude the hole to the correct height or thickness using the Hole command. Alternatively, the manual describes a tilt-up process that lets you build a wall flat and rotate it after punching the openings.

ModelShop allows almost unlimited modification of any selected object. You can drag the handles or vertices using the mouse, or use the keyboard to specify *x*, *y*, and *z* coordinates. The nudge tool is really a set of tools using the arrow keys and a variety of menu options to create views of the model. In Views mode, the arrow keys move the viewpoint around the model in 5-degree increments. In Light mode, the arrow keys move the lighting or change its intensity or ambience. In Fly mode, the arrow keys move the viewpoint forward or backward, left or right. Contour lets you nudge topographic contour lines on a site plan (scanned in or drawn) up or down in user-specified increments to create a 3-D site plan.

In ModelShop a model is placed at the center of a sphere of arbitrary size; to change your point of view, you navigate through this sphere, altering your altitude and azimuth. You can place the model at any location on Earth if you know the geographic coordinates; then you can study the shadows cast at various seasons and times of day. Paracomp provides a special copy of Apple's Map cdev, adding most major American cities.

ModelShop enables designers to animate the shadows cast during any specified time period. Equally noteworthy is the ability to animate views: first you fly over the site; zoom in for a closer look; then stop, walk through the door, down the hall, out the rear, and fly off for a final view of the estate.

ModelShop's animation tools are simple and effective, but if you require a more sophisticated presentation, you can export models to a rendering program for touching up, then on to a high-end animation program like Director for integration of sound and titling. Files can also be exchanged in DXF format with other CAD programs.

Technical support is free of charge and the staff is knowledgeable, but you have to do a lot of button punching to reach a human voice. The user guide is well structured, and its overview of the program's basics stimulates you to get into the excellent tutorial.

Creating a model; changing lighting, shading, and viewpoint; and then building an elaborate animation sequence can be more fun than playing most computer games. But make no mistake, ModelShop is a powerful design and presentation tool. —TOM HARDY

24-Bit Paint-and-Draw Program

Aldus SuperPaint 3.0

PROS: Automated gradients; variable brush-transparencies; supports image masking and virtual memory; inexpensive. **CONS:** Only two layers; limited editing in SuperBits mode; quirky zoom view; some tools missing or weak. **COMPANY:** Silicon Beach Software (619/695-6956). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.5; 32-bit QuickDraw for color. Recommended: 4MB of RAM for color. **LIST PRICE:** $199.

SUPERPAINT 1.0 BROKE NEW ground by combining the ease of bitmap doodling and the capabilities of smooth-line drawing in a single, simple program. Version 3.0 is almost identical to version 1.0 in structure—it offers just one painting layer and one drawing layer, not the hundreds you can assign in Canvas or MacDraw. Also, SuperPaint supports bitmapped images on the drawing layer but doesn't allow object-oriented images on the painting layer. Bitmaps on the drawing layer can be edited, only in the SuperBits mode.



Tyrannosaurus Hexabyte SuperPaint 3.0 lets you create libraries of custom gradients, each of which can contain up to 256 colors (indicated by the oval knobs in the Custom Document Gradients dialog box).

SuperPaint has no point-by-point Bézier-curve tool. Instead, you must either draw a polygon and convert it to a Bézier curve or draw a freehand curve. And SuperPaint's reshaping functions are idiosyncratic; the user must ⌘-click to select multiple points or double-click on a segment to change its curvature. Finally, SuperPaint provides no manual method for joining two curves or closing open paths, you must use commands.

Elsewhere SuperPaint is a mixed bag. Its arrowhead-editing options rank right up there with Canvas's, but you can specify line weights in 1-point increments only. You can scale and skew type—not possible in MacDraw Pro—but there's no tabbing, kerning, superscripting, subscripting, or justification. The biggest disappointment is its magnification feature. Zooming in on an object-oriented line produces larger pixels, as in a dedicated paint program, instead of greater detail.

On the other hand, SuperPaint's automated gradient-fill function is very powerful, providing linear, square, radial, and peaked fills—the last of which creates a gradient that conforms to the shape of an object. You can specify the angle of a linear fill and position the center of a square or radial gradient. But what really distinguishes SuperPaint is its ability to assign up to 256 colors to a single gradient. Complicated gradients slow screen display dramatically, however, and there's no keyline display mode as in FreeHand or Illustrator.

SuperPaint 3.0 gives access to 16 million colors (2.0 had a 2-color maximum per bitmapped image). SuperPaint lets you create 24-bit paintings on an 8-bit monitor. Although SuperPaint has no color-separation capabilities, bitmaps can be exported as TIFF files, and object-bitmap combinations, as EPS documents. Documents can be separated using Aldus PrePrint or Adobe Separator.

In addition to the standard tools, the paint layer provides a paintbrush that supports the pressure-sensitive Wacom tablet. This paintbrush also works well without the tablet, varying line thicknesses according to brush speed. No tool anti-aliases, but a brushstroke's transparency can vary. There is no magic wand for selecting similarly colored areas of a painting. Nor is there an easy method for adding or subtracting pixels to a selected area.

SuperPaint 3.0 gains a few filters and

continues

textures, plus masking and the ability to use virtual memory. The filters include brightness, contrast, and color-balance commands; more-advanced filters, such as blur and sharpen, are missing. A basic masking feature can convert selections to masks and masks to selections; it can also add a selection to or subtract one from a mask. The masks are selection-dependent, however; you can't convert a paint stroke to a mask, for example.

The Texture feature allows you to create and store variably sized patterns containing both bitmapped and object-oriented images. They can be used to create remarkable fill and outline effects.

As a draw program, SuperPaint 3.0 falls short of Canvas but rivals MacDraw. As a paint program, SuperPaint handles 24-bit color and provides built-in virtual memory, but lacks antialiasing and skimps on selection capabilities and support for pressure-sensitive input. If you consider the substandard drawing with adequate painting, the top-notch documentation, and the price, SuperPaint is a decent package. It's not for graphics professionals, but it is an admirable introduction to the beginning or intermediate computer artist, just as it has in the past.—DEKE McCLELLAND

Gray-Scale Hand Scanners

The Complete Half-Page Scanner/GS

PROS: Supports 400 dpi and 256 shades of gray; powerful image-editing tools; online help. **CONS:** Must be last device in SCSI chain; LED is on control box rather than scanner; difficult to abort scans; occasionally crashes. **COMPANY:** The Complete PC (408/434-0145). **REQUIRES:** Mac Plus; System 6.0. Recommended: 2MB of RAM; hard drive; gray-scale monitor. **LIST PRICE:** $399.

ScanMan Model 32

PROS: Supports 400 dpi and 32 shades of gray; scans horizontally or vertically; includes Digital Darkroom; flexible output options. **CONS:** Internally terminated; built-in 25-pin cable; INIT-sensitive. **COMPANY:** Logitech (415/795-8500). **REQUIRES:** Mac Plus; System 6.0. Recommended: 2MB of RAM; hard drive; gray-scale monitor. **LIST PRICE:** $499.

ALTHOUGH HAND-HELD SCANners are no substitute for full-page scanners, either of these two gray-scale hand scanners is an excellent alternative for smaller tasks, where images are no wider than 4 inches. Even with glossy magazine pages or color photographs, there's no sacrifice in quality.

The ScanMan Model 32 consists of a hand-held scanner and a SCSI adapter box with a built-in 25-pin SCSI cable and a single 25-pin port, making it suitable as the first device in the SCSI chain. If you have additional SCSI devices, the ScanMan's internal termination should be removed. As with most current SCSI devices, you can set the SCSI ID number.

The ScanMan comes with a DA and an application. It's advisable to shut down unnecessary INITs before starting a scanning session. INIT activity can terminate a scan prematurely or arbitrarily paste odd segments together, resulting in a gray-scale jigsaw puzzle.

Before each scan, you must set three controls on the scanner. One governs the size of the dots that construct the grays; the second control sets dots per inch (from 100 dpi to 400 dpi); the third is for estimating image brightness and contrast. The software detects the resolution set on the unit and lets the user choose vertical or horizontal scanning.

The ScanMan's editing tools include the familiar eraser, brushes, pencil, eyedropper, and magnifier, along with patterns, shades of gray, and a brightness/contrast control. You can also make a selection transparent, which makes it easier to align pieces of a multiple-pass scan. The ScanMan saves and exports PICT, TIFF, and MacPaint formats and outputs scans as gray-scale, halftone, or high-contrast images.

The unit does an exceptional job on one-pass scans, but multiple-pass images are difficult to piece together, and the ScanMan's software tool kit isn't up to the more delicate tasks of professional-quality image editing. To make up for the deficiencies, Logitech now bundles the ScanMan with Digital Darkroom, a stand-alone image-editing program from Aldus/Silicon Beach—a substantial enhancement to the package's value.

The Complete Half-Page Scanner/GS hardware is similar to that of the ScanMan Model 32. The scanner also has three controls—number of bits, dots per inch, and brightness/contrast. Its speed indicator light is on the control box, not the scanner, which is inconvenient, since it's hard to watch the speed indicator while concentrating on getting a straight scan. Once the scanner has covered the preset image length, it automatically stops; if you want to stop scanning sooner, you must use your free hand to click on the on-screen Stop button.



The Complete Half-Page Scanner/GS Display In addition to the usual tools, the tool palette offers line- and shape-drawing capabilities, the ability to move skewed areas, and text options.



ScanMan The ScanMan software provides three palettes for touching up scans: tools, grays, and brushes.

The Complete Half-Page Scanner/GS SmartScan 2.0 software is a heavy-duty editing program, similar in design to Digital Darkroom. SmartScan handles multiple-pass scans about as well as does the ScanMan's software; both programs have trouble matching overlapping pieces and getting consistent brightness and contrast from one pass to the next. But SmartScan offers more options for cleaning up and enhancing scans. SmartScan adds line-drawing and shape-drawing tools, a text tool, and a skew tool for straightening misaligned segments. Menu options enable you to lighten, darken, blur, sharpen, and equalize images, as well as enhance edges. Modifying the gray map makes possible such special effects as solarization and posterization. SmartScan saves and exports PICT, TIFF, TIFF-LZW, MacPaint, and PostScript/EPS formats.

If you plan to stick with single-pass, moderate-resolution scans, either of these units will serve you well. However, if you have the money to lay out, then the ease-of-use and bundled software give the ScanMan Model 32 a slight edge.

—STEVEN A. SCHWARTZ

Flight Simulator

Microsoft Flight Simulator 4.0

PROS: Inexpensive; feature-laden; easy to use; excellent documentation; useful educational aid; great fun. **CONS:** No dogfighting; missing some DOS version features. **COMPANY:** Microsoft Corporation (206/882-8080). **REQUIRES:** Mac Plus; second disk drive; 2MB of RAM for System 7. **LIST PRICE:** $64.95.

FOR YEARS, MICROSOFT FLIGHT Simulator (MFS) for the Mac has lagged behind the DOS version. Version 4.0 now brings a new world of entertainment for the entire Mac line.

MFS supports the single-engine four-passenger Cessna Skylane, the Gates Learjet 25G, the Schweizer 2-32 sailplane, and the Sopwith Camel. The program closely models the real aircraft in weight, stall speed, rate of climb, speed limits, and so on. There are also three experimental models—prop, jet, and sailplane—for which you can change engines, airfoils, weight and balance, aerodynamics, and even the paint scheme. After designing your aircraft, you can take it up for a spin, admire it from the chase plane, and then watch it crash. Simulated engine noises match each aircraft and change with power settings.

The MFS instrument panel offers a full complement of instruments, navigation radios, and flight controls. The instrumentation and equipment satisfy the Federal Aviation Administration's minimum requirements for visual flight rules (VFR) and instrument flight rules (IFR). You can hide any or all instruments, however, to practice failure conditions (or to make your Sopwith Camel's cockpit halfway believable). An autopilot feature is also available.

You can use the mouse, the keyboard, or an optional joystick or yoke control wheel. Keyboard flying is easy, but limited and not realistic. Mouse flying is more intuitive, but takes practice. A handy floating palette lets you change viewing angle, magnification, and point of reference (cockpit, control tower, or chase plane).

MFS's world spans the continental United States, Canada, Mexico, and the Caribbean and includes 100 U.S. airports. Optional international scenery disks are available. Some metropolitan areas even have moving boats, cars, and other aircraft.

You can control the season and lighting. During night flying, the instrument panel simulates the night lighting found in real aircraft. The program also offers environmental controls, from ground texture, wind, cloud formation, and weather fronts, to turbulence, thunderstorms, and accurate nighttime star constellations. The weather changes, too.

MFS comes with a comprehensive 250-page manual and a quick-start guide; detailed reference chapters; an atlas of maps and navigation aids; aircraft performance specifications; and even a section on basic aerodynamics, flight maneuvers, navigation, and aerobatics.

The Command Flight Path Display (CFPD) displays a tunnel of rectangles on your windshield, depicting the correct flight path to your destination airport.

On low-end Macs MFS's animation is jerky. Turning off detailed scenery, color, shading, and weather smooths out animation, but results in a lackluster display. MFS works well on midrange Macs such as the IIcx and IIsi. Microsoft's excellent telephone support says that increasing application memory size improves performance, even on low-end Macs.

Still missing are 747 simulation, a scenery designer, network capabilities, and connectivity with Wesson International's Tracon air traffic control simulator. Microsoft says these features won't be added anytime soon, but AppleEvents support opens the door for third-party add-ons.

But even with these deficiencies, Microsoft Flight Simulator represents one of the best buys around.—MEL BECKMAN

Desktop Publishing Program

FrameMaker 3.0

PROS: Imports Microsoft Word files and styles; easy-to-use, new table feature; conditional text; international dictionaries. **CONS:** Word styles override FrameMaker styles if styles have the same name; numbers with parentheses and footnotes don't align; poor support for process color. **COMPANY:** Frame Technology (408/433-3311). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive. **LIST PRICE:** $795.

IN JANUARY 1991, I WAXED ECSTATIC about FrameMaker 2.0's long-document features, but I pointed out that it opened and converted Microsoft Word files rather than simply importing them, and it didn't import Word's styles properly. I also bemoaned the lack of good color support, nonexistent manual kerning, and the difficulty of creating complex tables.

FrameMaker (FM) 3.0 doesn't solve all these problems, but it has addressed the two biggest ones—importing Word files and creating tables. Importing Word files works almost as it should, but not quite. When you import a styled Word file, it comes in with all paragraphs tagged properly, with local hard formatting overriding the style-sheet formatting—just great. If you have identically named styles in the Word file and the FM file, however, the Word style overrides FrameMaker's style. There are workarounds, but it's an annoying problem.

FM 3.0 has an excellent table feature—equal to or surpassing Ventura's. It allows multiple paragraphs in a cell (a glaring omission in Ventura). You can build styles for tables, and reformat a table by applying a different style (and you can format the text within cells). Table styles include margin and indent specifications and sophisticated automated ruling and shading controls.

You can combine any group of table cells together into a single cell that straddles several columns, and there's excellent control over column widths for selected cells. You can specify a given width, a percentage of the current width, the width of another column in the table, equal widths for all selected columns (totaling a given width), scale all the selected columns equally (again, to fit a given width), or set certain columns to the width of a selected cell's contents. Cells can contain graphics and/or text, and they can be rotated in 90-degree increments. Tables can include a title (with optional autonumbering) and multiple heading and footing lines. Titles (with continuation notices), headings, and footings can appear on every page in multipage tables.

One key failing in the table feature is its inability to align numbers enclosed in parentheses or followed by footnotes. It takes a lot of jimmying around to get these working. Given that problem, and within FrameMaker's typographic limitations (no manual kerning, lack of letterspace control for justified copy), FM's new table feature is excellent.

The conditional-text feature is a bit of a misnomer. It isn't an IF-THEN setup, but it's close. You can specify that any piece of text be included in a specific version of a document, then show and hide the different version information either separately or in combination. Special formatting (colors, underlining, and so on) shows you which pieces of text go in which version.

Other changes include faster text display, support for more graphic file formats, improved index sorting, and suppression of blank pages when printing. International dictionaries, $195 for 12 additional languages, allow foreign-language spelling checks and hyphenation.

You can import 24-bit TIFF and DCS (Desktop Color Separation) graphic formats. FrameMaker doesn't really handle process-color work; you can't specify colors in FrameMaker using CMYK values.

FrameMaker 3.0 is still in a dead heat with Ventura Publisher. Ventura's a better production tool (largely due to its better typographic control), while FrameMaker excels in the whole realm of document creation.—STEVE ROTH

Miniature Trackballs

MicroTrac

PROS: Compact size. **CONS:** Difficult to control; awkward Control Panel interface. **COMPANY:** MicroSpeed (510/490-1403). **REQUIRES:** Any Mac with ADB port; System 6.0. **LIST PRICE:** $89.95.

Thumbelina

PROS: Easy hand-held operation; long cord. **CONS:** Hard to use when attached to keyboard. **COMPANY:** Appoint (510/417-0611). **REQUIRES:** Any Mac with ADB port. **LIST PRICE:** $99.

WHETHER IT'S BABIES, PUPpies, or subcompact cars, people seem to take an instant liking to small things—they're so darn cute. And so it goes with these two trackballs, both of which claim to offer the functionality of a mouse in a pint-size package. But as the crew in the movie *Fantastic Voyage* discovered, smaller isn't necessarily better.

The MicroTrac, with its miniature ball and buttons, looks like a conventional trackball that shrank in the wash. Like other trackballs, it can sit on the desk next to the keyboard; at 2 inches by 3, it's much smaller than most mouse pads. It also attaches to the side of the keyboard using a supplied bracket or can be hand held. Unfortunately, the MicroTrac's small size is a hindrance in desktop and keyboard use. The tiny ball makes it difficult to position the cursor accurately, a problem compounded by the ball's low friction and mass.

Macintosh users used to look down on multiple-button mice as, well, klutzy. But extra buttons are finally becoming accepted. The MicroTrac comes with a Control Panel device for customizing the operation of its three buttons. Used without the software, two of the buttons work like the one on the Apple mouse. Clicking the third button is the same as holding down the mouse button for dragging; a red light shows that it's active. Installed, the Control Panel software causes one of the other buttons to function as if the mouse button and shift key have both been pressed.

You can also use the Control Panel to assign keystrokes to the MicroTrac buttons. To invoke a key combination, hold down one button while clicking a second button from one to four times. A different key combination is produced depending on the number of clicks. Although fine in theory, in practice it's easy to become confused, and hit Save instead of Undo, for example.

Even smaller than the MicroTrac, the Thumbelina measures only an inch and a half on each side. It can be hand held or attached to the keyboard using Velcro strips or a plastic mounting bracket. As its name implies, you manipulate the Thumbelina's tiny ball with your thumb. Like the MicroTrac, the Thumbelina has three buttons: one to click, a second to drag the cursor, and a third to change the trackball's sensitivity. Unlike the MicroTrac, the Thumbelina has no software for customizing the function of the buttons.

I found the Thumbelina awkward to use when it was attached to the keyboard according to instructions. But away from the desk, the Thumbelina really comes into its own. The ball's snug fit, a liability in desktop use, is actually an asset for hand-held operation.

As ADB devices, both the MicroTrac and the Thumbelina are compatible with portables and notebooks, but most users will probably prefer to stick with those machines' built-in pointing devices. I can't recommend either trackball for routine use with desktop Macintoshes. If you're really cramped for desktop space, though, give the MicroTrac a try, and use the Control Panel software with caution. For controlling stand-up presentations that don't require a keyboard, I prefer the Thumbelina—the ball has a nice tight feel, the buttons are well laid out, and the cord is plenty long.—FRANKLIN N. TESSLER

Crossword Puzzle Collection

Puzzle Master 1.03

PROS: Great puzzles; includes scoring system. **CONS:** Immature interface; poor multitasking support. **COMPANY:** Centron Software Technologies (800/848-2424). **REQUIRES:** Mac 512K; 800K disk drive; System 4.1. Recommended: Hard drive. **LIST PRICE:** $49.95; annual subscription (100 puzzles per quarter) $59.95.

IF YOU FEEL CONSPICUOUS IN YOUR office with a copy of the *New York Times* folded in your lap while you finish the morning crossword, Puzzle Master is for you. In fact, it is for anyone who is more than an occasional crossword solver.

Puzzle Master is a package of data as much as it's a software application. The data is superb: the only electronic version of the *New York Times* puzzles—for many crossword aficionados, the only puzzles to do. The application itself is serviceable, but not outstanding.

The program comes with 200 daily and 50 Sunday puzzles. Even at a half hour per puzzle (good luck), this is 125 hours of fun. For a subscription fee of $59.95, you get 100 puzzles every 3 months for a year, which compares favorably to buying them in book format, and the puzzles span more than 15 years back to protect those who still do the daily newspaper puzzle.

The software was obviously an afterthought to Centron's terrific licensing deal. It is a no-frills implementation of what you'd hope a crossword program might be. To a point, that's just fine; what you really want is to get straight to the puzzle without gimmicks or hassles, and for the most part that's what Centron delivers. Where the program falls short is the interface.

After launching the program, you select a puzzle and get to work. Horizontal and vertical clues appear in separate scrollable boxes to the right of the puzzle grid. The windows cannot be resized or rearranged, precluding you from seeing the whole puzzle and its clues, as puzzle people are accustomed to doing. Entering answers is somewhat clumsy. You can't navigate via arrow keys or keyboard commands, and you must change the check box at the bottom of the screen to change direction.



Your Turn This is an average puzzle in play. Note the clock, and can you guess 25 across?

Once you're used to the quirky interface, however, you can appreciate the program's cooler features. Most important, you can change answers without smudging your newspaper. The adjustable scoring system is fun, with scores related to number of errors and completion time. You can save puzzles at any point, and print any combination of clues, grids, and answers.

The program can also be used to create puzzles, but the critical task of authoring must take place offline; the program can be used only for data entry and printing. Centron plans to release a crossword authoring program in the spring.

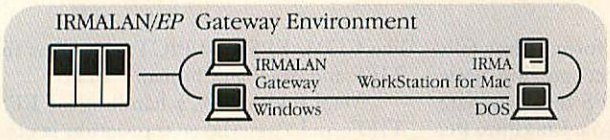
Although the program is 32-bit clean, the Mac must be set to 256 colors or less (Puzzle Master works fine in black and white). Otherwise, you get hellish yellow puzzles instead of the pleasing black on a blue background. The program operates under System 7 but generally does not allow switching between applications during play.

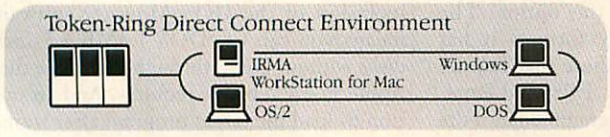
If you're stumped, Puzzle Master can fill in answers for you, but it docks you some points. On the other hand, if you encounter technical problems, Centron's support is toll-free, unlimited, and helpful. All in all, Puzzle Master is a winner.—DAN LAVIN

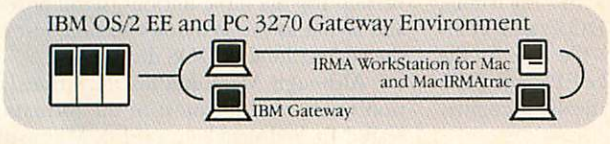


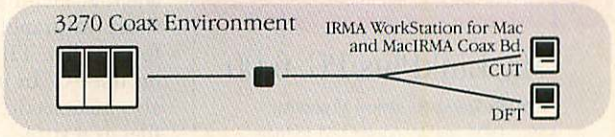
Until now, there was only one place to get a Mac to go with everything.

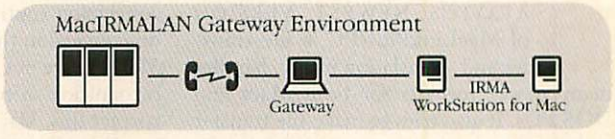
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Circle 71 on reader service card

Arcade Game

Hole-In-One Miniature Golf 1.1

PROS: Top-notch graphics; inexpensive; multiplayer format; easy to learn and play. **CONS:** Cumbersome without a hard drive. **COMPANY:** DigiTek Software (813/973-7733). **REQUIRES:** Mac 512K. Recommended: Hard drive. **LIST PRICE:** $39.95.

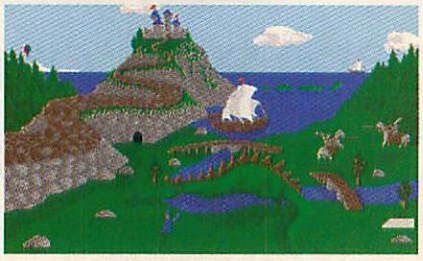
WARNING: HOLE-IN-ONE MINIature Golf is not for the golf purist. Jack Nicklaus never saw anything like this at the Masters; but then, you never saw anything like it at the local putt-putt either. If you want a classic golf game with classic golf course layouts, don't buy Hole-In-One. But for quality graphics, superior playability, and entertaining format, Hole-In-One is simply a terrific miniature golf game.

One of the game's best attributes is that you can jump into it as soon as you have taken it out of the box. The manual is direct and easy to understand, but if you need more help, there is an 18-hole tutorial course. One trip through it, and you're ready to tackle any challenge on the game's four courses.

I wouldn't try Hole-In-One without a hard drive. The game comes on four disks, none of which can be used to start the computer, and switching disks—required after completing every hole—is tiresome. But if you have a hard drive, Hole-In-One is worth the small price of admission.

Most golf games show the layout of a hole only from a point of view behind the player's back. Hole-In-One shows that, plus an overhead view of each hole and, where appropriate, contour views that are especially helpful when first learning the game. The digitized sound effects of crowd reactions to a hole in one and a near-miss add realism. And when you do ace a hole, you can watch an instant replay of the action.

Knowing how to putt is the key to success. You control your putting exclusively with the mouse. First you place the ball on the starting pad and stretch a line from the ball toward the hole, then you click the mouse button. The longer the line, the stronger the shot—too long and you overshoot the cup; too short and the ball lands shy of it. To boost the challenge, there's also an oddly named Pool Cue shooting option in which you set your backswing.



Golfing in Wonderland This fairy tale of a hole can be found on the Menagerie course.

Each of Hole-In-One's four courses can be set for any of three skill levels. I recommend starting with the Classic course. It doesn't have too many difficult holes, so your frustration level stays low, but it provides enough challenge to keep you entertained; plus it's a good warm-up for the Intermediate and Expert courses.

The Intermediate and Expert courses include more hazards, moving obstacles, and twists and turns. The final course is called the Menagerie. Unlike the other courses, which can be played in black and white or color, the Menagerie works in color only and has whimsical graphics clearly intended for kids. The Menagerie contains everything from a medieval castle to a pinball machine.

Just to be safe, Hole-In-One offers a potentially job-saving feature, the Boss Key, which hides whatever golf course is on screen behind a functional word processing window. But if your boss is like mine, you won't need this ruse—she nabs Hole-In-One for her own use.—ANDREW MILLER.

File-Transfer and -Translation Utility

MacLinkPlus/PC 6.00

PROS: Translates almost all popular Mac, DOS, and Windows text formats and many graphics formats. **CONS:** Has trouble recognizing graphics formats. **COMPANY:** DataViz (203/268-0030). **REQUIRES:** Mac Plus; PC running MS-DOS 2.1. **LIST PRICE:** $199.

DATAVIZ'S NEWEST VERSION of MacLinkPlus/PC, a file-transfer and -translation utility, handles many newer formats for both Macs and DOS PCs. It also tries to make the transfer and conversion process much easier by automatically recognizing files' formats.

Version 6.00 contains both Mac and PC disks (with DOS and Windows versions), as well as cables and adapters to let you connect almost any Mac to almost any DOS machine. (DOS users should note that a serial port is required, so users with both a modem and a mouse that use serial ports may be unable to connect these cables.)

The Mac software does the actual translation—it is the brains of MacLinkPlus/PC—which means that the translation burden is primarily on the Mac users.

MacLinkPlus/PC 6.00 tries to identify the type of the files being transferred. It is adept at identifying text formats but falls short on graphics, not recognizing basic formats like TIFF and EPS that originate on the PC. In my tests MacLinkPlus/PC also incorrectly identified PC PageMaker files as text files. There is a semiautomatic option that lets you confirm MacLinkPlus/PC's assumptions, so you can correct these glaring errors before translation begins. Unless you always transfer text files, I suggest that you always use this option. The program recognizes only formats it has conversion routines for; those that require no conversion (like TIFF, EPS, and PageMaker) have not been programmed into the recognition software. A future version will correct this, DataViz says.

DataViz could make its automatic recognition for graphics smarter by having at least the option to recognize DOS formats by their extension (the three letters that follow the period at the end of a file name), since the convention in DOS (and Windows) files is to identify a file type by the extension. That would make EPS and TIFF files, for example, automatically recognizable most of the time.

Recognizing that most people have a standard format they want their files translated to, MacLinkPlus/PC lets you set the default target format for text, spreadsheets, bitmap graphics, and database files. But it lacks options for vector graphics formats like CGM, EPS, and PICT, as well as the TIFF and MacPaint bitmap formats.

MacLinkPlus/PC's handling of EPS, TIFF, and PageMaker translation is confusing. While you can select these formats as part of normal binary transfer, they are also available as independent transfer options, which unnecessarily makes the user think about what transfer option is selected.

Mac users get two special features: The inclusion of the DOS Mounter software means you can use DOS 1.4MB 3.5-inch disks without going through the hassle that Apple File Exchange requires. And an option to load the target program after translation saves you a little effort.

The Windows software works pretty much as you'd expect. The only surprise is that transfer speed from Windows is limited to 19.2 Kbps, while the Mac and DOS versions can run as fast as 57.6 Kbps. The DOS version has the same buttons, scroll boxes, and layout as the Windows version, just in the coarser look of DOS display.

Although MacLinkPlus/PC's translation works well for most of the formats I tested (it had problems with a Microsoft Works for Windows database file), it falls short of the intuitiveness the program's designers aimed for. But MacLinkPlus/PC continues to do an outstanding job of converting between file formats.

—GALEN GRUMAN



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Circle 113 on reader service card

HyperCard Database

Student's/Writer's Dreamtools

PROS: Huge range of historical and cultural events; wealth of slang terms. **CONS:** Biased selection and organization of data; HyperCard 2.0 functionality under-used. **COMPANY:** Slippery Disks (213/274-3600; order through Heizer Software, 800/888-7667). **REQUIRES:** Mac Plus; hard drive; System 6.0.5. **LIST PRICE:** Student's Dreamtools $89; Writer's Dreamtools $149.

IN HIS CHATTY, OPINIONATED manual to Dreamtools, Larry Belling, the program's creator, recommends this globe-spanning collection of facts and data to students and writers who want to jazz up their articles and reports. A dream come true? Yes, but remember, dreams are personal, as this collection of eight HyperCard stacks demonstrates.

This omnibus database inexplicably leaves out some facts while others are curiously prominent. A student writing an essay on Brigham Young need only check the stack to find that Young's birthday coincides with the anniversary of the publication of the first *Superman* comic. But if the student wants to locate the publishing dates of a few well-known twentieth-century books, he or she'll come up empty-handed.

Along with Births, Deaths, and Events, each card in the Events Day-by-Day stack has a field for Feast Day of Saint. The day-by-day view of history is nicely supplemented by the Decades stack. Buttons allow you to peruse several fields—art, fashion, the media, science, and so on—thereby gaining a sense of concurrent happenings, decade by decade, from the 1650s to the 1980s. A scroll through 1910's Science field reveals this tidbit: "First heart surgery performed—on a dog." But the stacks don't tell you where, when, or by whom it was performed. A stack containing hundreds of lists of questionable value rounds out Student's Dreamtools. Two more stacks, the mediocre Catch Words and Phrases and the weirdly wonderful Slang Thesaurus, are provided in the Writer's package.

Once you're familiar with the Events Day-by-Day stack (it's not especially intuitive, so check the manual), you can go to it with an amazing variety of questions and, due to field-specific searching, get answers fast. Search for Mexico City in the Events field, and you'll find the date of the 1985 earthquake, along with the Richter-scale rating and number of fatalities. There's even a My button that brings up blank text fields so you can add other events.

The Slang Thesaurus helped me double-check terms I'd scribbled while interviewing prisoners for an article on California prisons. To find *snitch*, I chose the letter *I* from the title card index, then clicked on *Informant*. The card rounded out my vocabulary with other words and phrases—*drop a dime*, *rat*, and the Australian *fizgig*—organized by part of speech. The manual warns you about this stack, and for good reason. Someone took the time to dredge up a superabundance of sexual and racial slurs.

My biggest beefs with the package have to do with stack design. The stacks lack the professionalism you'd expect in a commercial HyperCard product. Button functionality is inconsistent; use of both button text and icons is sloppy. HyperCard 2.0 features are employed erratically. HyperCard users must bypass their own Home stack or get an error message when they open the Dreamtools stacks; a one-line "start using" command in the stack scripts would have prevented this problem. Multiple stacks stay open, cluttering the screen with no apparent benefit. Plus, Dreamtools lacks the animation, scanned photos, digitized sounds, and artwork that make using HyperCard a delight. Finally, I'd like to see hot-linked text, so information on related topics would be more easily available. But while I'm waiting, I think I'll look up some slang words for *gang*.—KAREN L. CALLAWAY

Mathematical Simulation Software

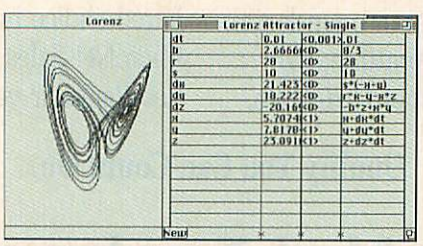
Models 1.04

PROS: Basic approach to mathematical modeling; compact; fast; flexible graphics support. **CONS:** Small problems with stored animations. **COMPANY:** Lascaux Graphics (602/544-4229). **REQUIRES:** Mac Plus. **LIST PRICE:** $89.95.

ONE OF THE MOST STRIKING mathematical conclusions of the last few decades is that very simple models can have unanticipated and extremely complex results. The colorful fractal images seen everywhere, and the applications of chaos theory to weather prediction, quantum mechanics, and stock price forecasting—all these stem from recent interest in a handful of iterated (repeated) models that can be implemented on any computer. In contrast to the models found in physics or calculus textbooks—where a result usually means an algebraic expression—iterated models call for a computer to simulate step-by-step changes in equations, from a starting time to the future, as a long series of numbers.

Besides software designed specifically for modeling (Extend, Stella, Simul), general-purpose mathematical software (Mathematica, Maple, MathCAD) can handle iterated models. The difficulty is that, while equations and repeated calculations are easy enough to write, producing the appropriate graphic display of the results can be difficult for beginners.

Models makes both equation-modeling and graphic display nearly effortless. You begin a typical Models session by calling up a new worksheet and a new graphics window. The variables in the model are listed in the first column of the worksheet, current values in the second column, initial values in the third, and the expressions that define the variables in the fourth (see "Butterfly Effect"). The definitions are expressed in typical algebraic notation. Models has a full set of functions, including a random number generator, and you manage the details of iteration by choosing items in the Run Models menu. Because the program is designed specifically to run iteration models, there's less programming for the user in Models than in any other current approach.



Butterfly Effect This plot shows the two wings of the butterfly pattern characteristic of the trajectories of the Lorenz attractor, and the worksheet window at right shows the simple structure of the Lorenz model. Models requires no programming beyond the basic definition of the model in algebraic terms.

To see a plot in the graphics window, you simply pick the variables you want to plot from the Axes dialog box. You can display multiple windows with different pairs of plotted variables. Models includes both commands and button tools for modifying, scaling, and rotating. As an additional graphics feature, Models lets you save the frames corresponding to the individual time steps in a simulation and play them back as an animation. Combining simulation playback with frame-by-frame incremental rotation of coordinate axes can produce spectacular and revealing visuals, and Models lets you do this through the Animation dialog box rather than requiring strenuous programming effort.

Models is compact (about 100K for both the coprocessor and noncoprocessor versions), fast (25 iterations per second for the Lorenz model on a Mac II), and inexpensive. It includes a good set of examples, and the manual is suitable for beginners and experienced modelers alike. Models is the easiest way to try out simulation ideas, and it's even a bargain.—CHARLES SEITER

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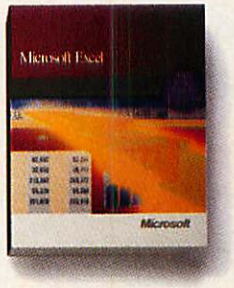
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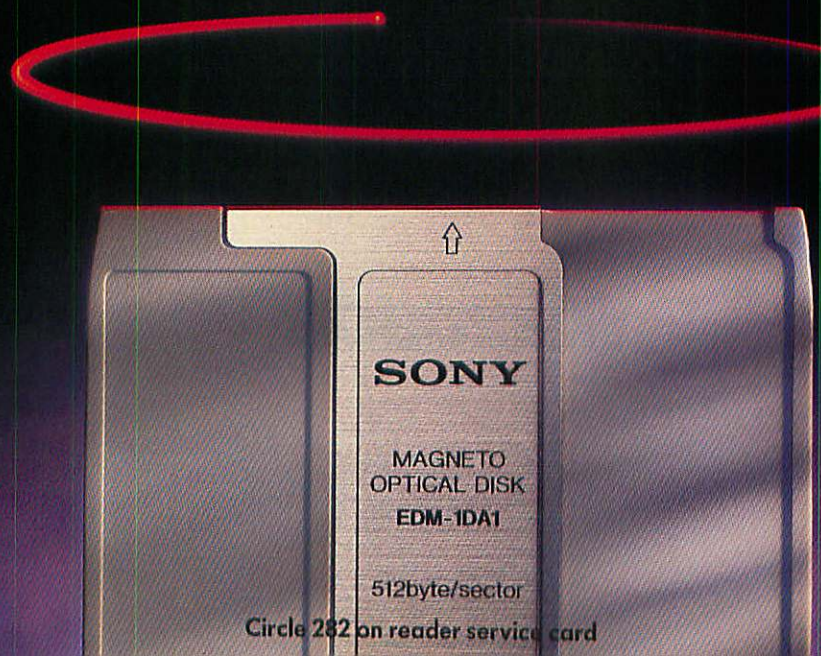
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Legal Software Packages

LivingTrustBuilder 2.0

PROS: Templates display document in progress; includes manual on how to avoid probate. **CONS:** Weak word processing format; no mail merge. **COMPANY:** Jian (415/941-9191). **REQUIRES:** Mac 512K; word processor. **LIST PRICE:** Version 3.0 $139.

TrustMaker 1.0

PROS: Radio-button data entry; imports data from WillMaker. **CONS:** Does not display document in process. **COMPANY:** Legisoft (415/566-9136). **REQUIRES:** Mac 512KE. **LIST PRICE:** $99.

TRUSTMAKER 1.0 AND LIVINGTrustBuilder 2.0, two different attempts to adapt the Mac to the do-it-yourself legal market, are both designed for a nonlawyer to quickly create a living trust, which is a legal entity for holding property; both also warn the user to consult with an attorney to ensure the validity of the final document. Each in its own way—TrustMaker by means of a question-and-answer approach, LivingTrustBuilder using word processor templates—helps the user produce serviceable legal documents easily.

Of the two, I prefer TrustMaker for its double-clickable Mac interface and its precautions against really mucking things up. A fair amount of planning is required before beginning because the question-and-answer process is very rigid. In general, you can return to the previous screen or proceed to the next, but any major change to the trust structure requires a trip to the File menu's Erase and Start Over option. This may seem cumbersome, but it helps avoid errors that might invalidate the trust.

TrustMaker can read from Nolo Press's WillMaker, sparing you some data entry if you have previously produced your own will with WillMaker. Unfortunately, while you're answering TrustMaker's questions about yourself and your assets, you can't view the document in progress or judge how much further you have to go. Once you've finished, you can preview (but not edit) your trust on screen and save it to a disk as a text file. The overall procedure is rather clumsy, but it gets the job done, and at $99 TrustMaker is cheaper than even contemplating hiring an attorney.

LivingTrustBuilder 2.0's master disk consists of a set of templates in two outdated Mac word processing formats, MacWrite 4.5 and Microsoft Word 1.0. Before you can use a template you must import it into your favorite word processor. A quick peek at the documents reveals that they were ported to the Mac. Word processing veterans will recognize the problems and be able to work around them, but new Macintosh users may find them quite frustrating.

LivingTrustBuilder requires the user to perform a search and replace for variable terms in the templates. *Q* variables represent primary information in the trust; *W* variables are for optional clauses, such as those pertaining to a spouse. An Insertion Codes document shows what person or thing is represented by *Q1*, *W2*, and so on. One advantage to this approach, as opposed to TrustMaker's, is that the full document is accessible and editable on the screen. A potentially serious hazard is that the user can rearrange and otherwise alter paragraphs, possibly invalidating the document.

LivingTrustBuilder's most glaring omission is a merge facility. The user has to search and replace all instances of *Q1*, for example, with the right name or phrase, repeating the process for each variable. It would be more elegant and efficient to fill out a data template and then merge the information with a new document.

No software (yet) can alter the inevitability of death and taxes, but being prepared can help ease the prospect of facing them. By far the most daunting aspect of using either of these programs is gathering all the information you need before you sit down to draft a will.—BILL DAVIES

Graphing and Data Analysis

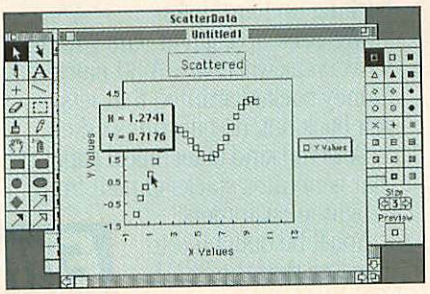
SuperAnalyst 1.29

PROS: Good plot assortment; curve fitting; includes numerical integration/differentiation; Fourier transforms. **CONS:** Needs better file import; occasional crashes on 1MB Macs. **COMPANY:** SuperSoft (801/225-4356). **REQUIRES:** Mac Plus; System 6.0.5. Recommended: 2MB of RAM. **LIST PRICE:** $195.

SUPERSOFT HAS A GOOD IDEA here. You can find graphing packages with dozens of plot types and drawing tools but no analytical facilities. There are math packages for analyzing data, but most of these suffer by comparison with real presentation graphics programs (an exception is Wolfram Research's Mathematica, which is much more expensive and takes 6MB of RAM to run comfortably). SuperAnalyst combines selected graphing and analysis tools in a single program.

SuperAnalyst includes standard business plots (bar, area, pie) and scientific charts (scatter, line, log and log variants, polar). You directly enter the data to be plotted or import it into a spreadsheet-style file, and select the plot from a menu of sample-plot pictures. It's exceptionally easy to modify chart features for presentation—control of chart color, shading, and text is simple and precise, and other details are managed through truly self-explanatory dialog boxes.

SuperAnalyst goes beyond mere presentation of raw data. Besides linear and polynomial curve fitting, it offers fits with cubic splines, user-defined functions (specified using a function list that ranges from standard transcendentals to gamma, Bessel, and error functions), and Fourier components. SuperAnalyst provides four kinds of numerical integration, a variety of differentiation and zero-finding routines, and a slick Fast Fourier Transform (FFT) facility. The FFT section can handle 512-data-point transfers in just a second or two on a stock SE, automatically zero-fills incomplete data, and plots results for further analysis. SuperAnalyst also supports basic statistical functions and user-specified arbitrary transformations of data sets. The interaction between transformation and analysis capabilities and graphing is particularly helpful; you will find yourself digging a little deeper into the data for patterns just because it's easy to do and the graphical results are prompt.



Good Points SuperAnalyst sports many touches to complement its mathematical sophistication—when you click on a plotted point, the program reports its coordinates, as shown.

This admirable feature list is duplicated by no other products, and SuperAnalyst can be learned in 15 minutes. This product, however, is not quite finished. It needs, in order of seriousness: better file import/export (direct transfer to Excel would help); attention to memory-limit–related System crashes; and safer disk-file handling. On this last point, the program sometimes refuses to save files—the sort of behavior that can provoke unseemly remarks from a user who has spent a few hours entering data. SuperSoft has expert phone support and issues bug fixes and updates with remarkable speed (we received three in a month).

SuperSoft has selected a wonderful set of data-analysis features and combined them with an attractive interface. The version we tested was annoyingly fragile, but SuperAnalyst only needs some refinement to be a remarkably useful program.—CHARLES SEITER



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Pinball Game

Tristan 1.02

PROS: Realistic feel; fast moving; spunky sounds. **CONS:** Repetitious; extensive hardware requirements; single player only; can't change board levels or difficulty levels; copy protection. **COMPANY:** Amtex Software Corporation (619/967-7900). **REQUIRES:** Mac II with math coprocessor; 4MB of RAM; 640-by-480 resolution, 13-inch color monitor; System 6.0.7. **LIST PRICE:** $69.95.

TRISTAN HAS ALL THE SOUNDS, speed, and feel of a real pinball game. And while this is a solid endorsement for the programmers, the game offers nothing new except that you play it on your Macintosh.

The layout has the traditional bumpers, drop targets, mushrooms, and ball-catching pockets. Knocking down the drop targets activates the extra-ball light or the lock-ball pocket for multiball play, which allows two balls to be played at once, an addition that can add millions of points to your score.

You have only three balls for each game, but you can earn extra balls during play. Tristan so closely mimics pinball that players must use the same tactics as they do with the Bally machine down at the mall, using flippers and nudging the machine. By pressing the spacebar you can add speed to the ball as it reflects off the bumpers. Nudging the ball with the spacebar as you hit the ball with the flippers sometimes gives the ball the extra oomph it needs to get back to the top section, where most of the scoring occurs. Too much nudging tilts the machine. The ball invariably acts as it should, responding to nudges, other balls, spins, and gravity's pull toward the bottom of the screen.

Tristan's sounds are a definite plus. A few noises are borrowed from the Macintosh, but Amtex blended in nice touches such as the flutter, which rewards you with an extra ball. The flutter music mimics the first few notes of Peter Gabriel's song "Sledgehammer."

Unfortunately, Tristan has no options. The keys used for the flippers cannot be changed, there are no difficulty levels, the playing field never significantly alters, and two players can't play together, alternating balls as in real pinball.

Even entering scores is difficult. Instead of typing your name using appropriate letters on the keyboard, you must use the flipper buttons (z and backslash) to advance through the alphabet and select the letters individually. For example, to type *Scott* you must hit the backslash 18 times to get to *S*, push the spacebar to enter the letter, then hit the backslash twice to get to *C*, push the spacebar to enter the letter, and so on.



Multiball Play Tristan heats up when two balls (silver shadowed circles near upper right and middle left) are in play at one time. While Tristan gives players only three balls per game, extra balls are easy to score—note the Shoot Again light near bottom right.

Because Tristan runs only on color Macs (or an SE/30 with an external color monitor) it cuts out many potential players. Amtex said it expects to ship an LC version soon, but that the feel of the game will remain the same.

This program superbly lives up to its billing as a "solid state pinball" game, and it is a good arcade-type game. But it lacks the options necessary to keep one's attention after the original excitement dies down.
—SCOTT PURDY

Personal Contacts Manager

Intouch 1.1.7

PROS: Fast; networkable; easy to use. **CONS:** Limited import capability; fixed window size. **COMPANY:** Advanced Software (408/733-0745). **REQUIRES:** Mac 512KE; Mac Plus, System 6.0, and Apple-Talk-compatible network for Intouch Server. **LIST PRICE:** Single user $69.95; three users $199.95.

A PERSONAL CONTACTS MANAger needs to be flexible, fast, and readily available. Intouch, a DA, is a free-form database with two fields, one for addresses and one for notes.

Intouch is easy to set up and use; I did it without consulting the manual. You enter addresses on the left side of the data window and enter notes on the right side. If you need more room for notes (more than 32K per record), you click on the zoom icon, and the notes field expands. Intouch lets you time-stamp your notes, and you can also record elapsed time, an extremely useful feature for telephone calls. Intouch can dial phone numbers and credit card numbers, and can handle special PBX dialing and local or long-distance calls. Locating an address with the search field is fast—about a second with 1000 records. Intouch's documentation is almost superfluous for a product this easy to use. One complaint I do have is that the data window is too small; you often have to scroll to see your notes.

Intouch prints envelopes in up to 15 user-definable layouts and can include the postal service's bar codes. You can also print labels, but only one at a time.

Advanced Software's Intouch network allows an Intouch file to be shared over an AppleTalk network. You establish one Mac as the server (it doesn't have to be a dedicated server, and TOPS or AppleShare aren't required) by installing the Intouch Server application. The application runs in the background on the server Mac, and the Intouch data file also resides on the server. Users with the Intouch DA can then access the data file across the network.

Intouch Server uses a client/server architecture for speed and to minimize network traffic. In other networked databases, when the client asks for information from the server, the server may need to send the entire data file to the client, where the actual search is performed. Intouch sends the search string to the server, which does the searching and sends back only the result. The server deals with record locking, so that only one user can modify a particular address at one time. I found Intouch Server simple to set up and use, and performance with three users was good.

Although Intouch serves some of the same needs as DynoDex or TouchBase, those products are a better choice if you need to print address books and labels, or if you need to maintain an address list for mail merge. Intouch's strengths lie in its free-form entry and note-taking flexibility. The real competition is from shareware desk accessories and Casady & Greene's QuickDex. Intouch lets you print envelopes and labels; QuickDex II, the current version, requires a separate envelope-printing DA. Import and export are better in Intouch; QuickDex II requires a separate PrintDex application. Intouch does time-stamping better. On the other hand, QuickDex II allows you to have several card decks open at a time; Intouch allows only one. QuickDex II also has more flexible telephone dialing, a larger window for data, and you can display information in any font and any size. QuickDex II's searches are slightly faster than Intouch's; QuickDex II finds a record with no perceptible delay, while the Intouch search takes about a second.

Intouch is a better choice than QuickDex II if you need to share data because Intouch also has a network version. For solitary users, the two products are close, and your decision comes down to personal preference. For me, Intouch wins out by a nose.—TOM NEGRINO

Movie Database

Video Companion

PROS: Useful; fast; easy to use; wonderfully indexed. **CONS:** Bland keywords; no printing capabilities. **COMPANY:** Electronic Movie Guide (415/367-9500). **REQUIRES:** Mac Plus; hard drive. **LIST PRICE:** $29.95

THERE'S A KIND OF AGONY I EXPERIENCE when I'm trying to find a movie in a video store—an agony that multiplies exponentially based on the number of people I'm with. Maybe, once in a while, a movie I've been wanting to see is just waiting to be picked off the shelf, but more often I hopelessly wander the aisles wondering what all those boxes contain. My friends do the same—and if it's hard for one person to choose, imagine the terrors of three or four trying to decide together.

Video Companion solves that dilemma. Basically, it's a database of movies on videotape. No big deal, right? But two wonderful things about Video Companion make it more than your average database.

The first is the simplicity of the interface. Using either the Search menu or the keyboard commands, enter your search criteria, click on the search button, and a list of all applicable movies appears. If you want to know more about a specific movie, click on the title, and a brief summary appears. The process is completely intuitive, and anyone who has ever used a Mac will pick it up in a minute or so.

The second thing is the multitude of ways in which you can look up movies. Each movie description contains a variety of information, including title, actors, director, other credits, keywords, country of origin, year, ratings, and Academy Awards. The keywords category includes genre and theme descriptions, setting, character types, relationships, and much more. All this information is indexed so that you can look up movies by just about anything.

Suppose you can't remember the whole title of the movie, but you remember one word, *wonderful*, for example. Fine, type **wonderful** and the Mac retrieves a list including *Some Kind of Wonderful*, *It's a Wonderful Life*, and *The Wonderful World of the Brothers Grimm*. Suppose you're looking for a movie and you don't know the name or any of the actors, but you remember it was set in Guatemala. Enter **Guatemala** under the keyword category, and you'll discover that the movie was *El Norte*. You can retrieve a list of all the movies starring a certain actor, search by a range of years, as well as a specific year, and even search by Motion Picture Association of America rating (G, PG, and so on).

The summaries of the movies are short and simple—only one to two sentences. While the descriptions don't have the entertainment value of a good movie review, they also don't have the biases of a bad movie review.

Video Companion will be updated quarterly and the first update is free. Electronic Movie Guide also creates Special Editions, versions in which video rental stores and home viewers can mark the videos they own.

All of that was the good news—but there had to be a little bad, as well. There is no way to print. Even cutting and pasting to a word processor is impossible. The company says it might add printing capabilities to a later version, but meanwhile, you cannot print a list of movies to take with you to the local video store.

Also, Video Companion is not really a product for a devoted movie fan. First of all, 5000 movies is not all-encompassing. Some of my obscure favorites are missing. Furthermore, the keywords, while detailed, are also bland. Yes, you can look up Mongolia, but you can't look up slasher movies or screwball comedies.

Still, for the price ($29.95), Video Companion is an incredible bargain. It might not be perfect, but it's well executed—and could easily make going to the video store a lot more fun.—WENDY SHARP

Educational Game

New Math Blaster Plus 1.0

PROS: Includes a variety of games; colorful graphics and sound effects; nonviolent, ecological theme; editable data files. **CONS:** Can't change content without quitting games; can't lock teacher controls. **COMPANY:** Davidson & Associates (310/793-0600, 800/556-6141). **REQUIRES:** Mac Plus; 2MB of RAM for color; System 6.0.4. **LIST PRICE:** $49.95.

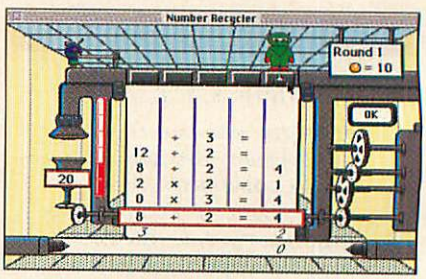
WHEN MATH BLASTER WAS RELEASED in 1985, few Mac-compatible educational software titles were available, and none matched Math Blaster's winning combination of arithmetic drills and arcade action. Today Math Blaster has plenty of competition, including programs that use state-of-the-art graphics, color, sound, and animation. Compared with packages like MECC's Number Munchers and Great Wave's Number Maze, Math Blaster doesn't measure up.

New Math Blaster Plus contains four games built around the adventures of a cartoon Blasternaut who embarks on an ecological mission in outer space. The first game, Rocket Launcher, is a basic arithmetic drill that rewards a string of successful answers with an animated rocket launch. I find it educationally uninspired, and my software testers are equally unimpressed by Rocket Launcher's entertainment value.

Trash Zapper is considerably more fun and educationally interesting. Here the player fills in blanks in equations. A sequence of correct answers produces an arcade interlude in which the player zaps litter left behind by inconsiderate aliens (earthlings, of course, would never litter).

The third game, Number Recycler, is an innovative educational activity that encourages the player to solve problems by thinking critically while analyzing number combinations. The object is to build equations at the bottom of the screen using stacks of numbers and operators. The numbers and operators must be used in the order they're stacked, but the player can recycle them to the top of the stack. Since you can recycle only a limited number of times, the player must plan carefully to avoid running out of numbers. Even without arcade action, Number Recycler is an engaging game that appeals to kids while it reinforces their mathematical skills.

Math Blaster, the fourth game, is a multiple-choice arithmetic drill designed to attract arcade-oriented kids (although my testers say it's not as much fun as real arcade games). It works well with a mouse or keyboard, neither of which is an adequate substitute for a joystick.



Number Conservation To construct equations that work, the player can push numbers and operators down into the recycling chamber, which currently shows a 3 and a 2.

Menu options let students and teachers select subject matter and level; most games can be set to cover topics from basic arithmetic to complex fractions. Unfortunately, you can't reset levels without returning to the main menu, nor can you lock students out of the controls. New Math Blaster Plus includes an editor for creating custom problem sets and printed tests. Both the program and the game editor are easier to use and navigate than the manual, which is full of wasted instructions for DOS users.

On balance, Davidson & Associates has done its homework and produced a winner. —GEORGE BEEKMAN AND THE SHOOBEDOOBOP SOFTWARE TESTING TEAM

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MacInTax does the rest. MacInTax asks you step-by-step questions and shows you how to enter every item. And like a good tax advisor, MacInTax helps you identify every deduction you can claim.

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Statistical 3-D Visualization Program

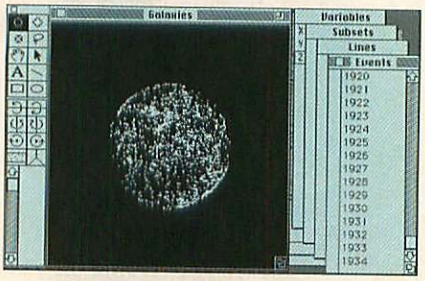
MacSpin 3.0

PROS: Fast; includes data-animation feature and basic business graphs. **CONS:** Not integrated into other statistics tests. **COMPANY:** Abacus Concepts (510/540-1949). **REQUIRES:** Mac Plus. Recommended: Hard drive. **LIST PRICE:** $295 ($100 for registered Abacus Concepts customers).

STATISTICS TEXTBOOKS FROM the 1920s and 1930s often contained the exhortation that, in spite of the labor involved, a statistical analyst should try to plot most of a data set before beginning numerical analysis. Despite agreement that plotting data is nearly always helpful and leads to important insight, plotting all the possibilities in a six-variable study would have been a dismaying chore in the precomputer statistics world.

When the first interactive graphics terminals appeared, Dr. John Tukey and others seized this new opportunity to do multivariate analysis graphically, and a new type of program was born. If you look at a two-dimensional plot on paper, for example, of gas mileage versus weight for cars, you can probably pick out the negative correlation between mileage and weight (that is, heavy cars tend to guzzle). With a three-dimensional plot on screen, you can scroll through a number of variables and select one for each of the *x*, *y*, and *z* axes, comparing mileage to weight and engine size at the same time, or mileage to weight plus a safety index, or any combination you want. By rotating the plot in 3-D space, you can see 2-D projections of any combination of the variables, as well as possible cross-correlations and combinations of influences at different rotations of the data-point cloud. D2 Software (for David Donoho, a pioneer in 3-D data visualization, and Andrew Donoho, his brother, who did the Mac programming) introduced this powerful technique in MacSpin 1.0. Abacus Concepts has expanded and embellished MacSpin in version 3.0.

Some of the features of MacSpin 3.0 are dazzling. A 3-D data display can be animated on a fourth parameter; as you move the slider at the lower left corner in the display, the points of the display fill in or disappear in accord with the parametrization of the fourth variable. Animation is particularly useful for examining the evolution of a data set; you can get a unique 3-D approximation of a time-series plot with time chosen as a fourth variable.



Intergalactic MacSpin 3.0 can spin this set of nearly 2000 data points as fast as you can click.

For large data sets, MacSpin's superior speed makes this feature actually useful rather than merely decorative. A less spectacular but eminently practical addition is 2-D graphing, with line, bar, and pie charts; scatterplots; and histograms. Abacus has also added a presentation layer (similar to StatView II's) for all MacSpin charts, letting you annotate charts with text and graphics.

MacSpin would be more convenient if it had an interface better suited to Abacus's other products. In version 3.0 the "interface" consists of notes on trading ASCII text files back and forth between MacSpin, SuperANOVA, and StatView. Tighter integration, or at least direct file exchange, is a reasonable request.

MacSpin 3.0 is still the best and most complete Mac program for 3-D visualization of data, despite admirable efforts by competitors. If Abacus brings this program into the StatView family, the result will be the most powerful compact statistics program on the market.—CHARLES SEITER

Hand Scanner with OCR

Typist Plus Graphics

PROS: Impressive accuracy, regardless of scanned material's font or size; enters scanned text directly into programs; built-in graphics module. **CONS:** Insufficient, awkwardly written manual; interface violates Apple's guidelines; no on/off switch. **COMPANY:** Caere Corporation (408/395-7000). **REQUIRES:** Mac Classic; 4MB of RAM; hard drive; System 6.0; MultiFinder. **LIST PRICE:** $695.

ON PAPER, CAERE'S TYPIST seemed miraculous—an inexpensive, hand-held scanner that could convert any printed text into editable word processor text. In reality, the original device was disappointing: the SCSI attachment box was crude, the manual weak. Worse, the Typist couldn't do the one thing that normal hand-held scanners *could* do: grab graphics. Caere has attacked that deficiency with such a vengeance that its reworked product is called Typist Plus Graphics.

There's still no on/off switch. But the SCSI box now comes with a T-connector cable, so that you can finally daisy-chain it with other devices (if you have a SCSI terminator). The new manual is still repetitive, and still needs proofreading. But Caere removed the Typist's troublesome autobrightness feature, which sometimes ruined text recognition by taking, say, the tabletop color into account. Most important, an intelligent ten-minute videotape now comes with the package. If you follow its counsel, you'll have greater luck getting the Typist to work as a text-input device.

The Typist's optical character recognition (OCR) feature really works, if you satisfy its three important conditions: the page must rest on a hard, flat surface; you must scan straight and slowly; and you must experiment with the all-important Brightness setting until it's just right. At that point, nonitalicized text from newspapers, magazines, manuals, bank statements, and annual reports appear on your screen with accuracy of about 95 percent to 100 percent.

The text pours into any program where you can type: word processors, spreadsheets, and so on. The Typist superimposes its desk-accessory software (via MultiFinder or System 7) on the program you want to type into. It's a reasonably fast process: after scanning, you wait 30 to 60 seconds for processing before words begin to appear on the screen (depending on your Mac, your settings, and the scan length). You can scan in any direction—sideways, for example, if the column is wider than the Typist's 5-inch lens. OCR with the Typist isn't as fast or easy as it is with a flatbed scanner and dedicated software—but then again, the Typist only costs a third as much.

The Plus's Minus

THE BIGGEST ADDITION TO THE NEW Typist is the pseudo–Digital Darkroom mode, which lets you edit line art or a gray-scale scanned image. Too bad it was evidently written by IBM programmers who are unfamiliar with the Mac interface.

There are indeed some potent features—masking, lightening and darkening brushes, multiple windows open on the same document—but the environment will confound anybody used to standard Mac graphics tools. You can't select something and press the delete key to remove it. A lasso selection doesn't deselect when you click the mouse. You can paste something you've copied, but the pasted image gets stuck in some weird, sliding limbo until you option-click. And so on.

In other words, the Plus Graphics aspect of the Typist needs an overhaul. True, the Typist portion can still use touching up: the manual isn't there yet and the software's nonstandard drop-down menus stay dropped until you double-click. Nonetheless, unlike other OCR systems, the Typist requires no training period each time it encounters a new typeface. For inexpensive, on-the-fly OCR, the Typist is looking more and more practical.—DAVID POGUE

CD ROM–Based Subscription Information Service

Nautilus

PROS: Convenient, timely source of shareware, demos, and information; bargain price. **CONS:** Some rough edges; potential for information overload. **COMPANY:** Metatec/Discovery Systems (614/761-2000). **REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.5; CD ROM drive. **LIST PRICE:** 12-disc subscription $137.40; international 12-disc subscription $149.40.

IS IT AN ELECTRONIC MAGAZINE? An optical bulletin board system? A virtual user group? Nautilus is all of these, and more. Metatec/Discovery Systems calls its publication a multimedia CD ROM–based subscription information service, a label that fits as well as any.

Nautilus, which began publishing in September 1990, is the first consumer-oriented CD ROM periodical. Subscribers receive a new issue every four weeks. A typical disc packs in so much information that it might take you four weeks to wade through it all.

Each disc contains a shell, created in SuperCard, that acts as the focal navigation and communication structure for exploring Nautilus. The shell provides several navigation options. You can move through hierarchical picture menus in HyperCard-like fashion, jump from section to section via pull-down menu, or use a full-featured Find command to zero in on particular subjects.

As you might expect from a HyperCard or SuperCard application, the shell is friendly but slow. If you prefer, you can bypass it and simply explore folders from the Finder. But if you're looking for a particular item in a back issue, browsing this way can be time-consuming and frustrating. Fortunately, each disc includes a comprehensive index in two formats: in On Location and in tab-delimited, plain text. The On Location indexes are a wonderful convenience for users of the On Location utility. Nautilus also includes a partially disabled version of the utility so subscribers can try it before they buy.

A typical issue of Nautilus includes dozens of software demos and previews, shareware and freeware programs, system software and utilities, fonts, HyperCard stacks, MIDI music files, digital sounds, programming tips, clip art, free-use photos, essays, editorials, news bits, and miscellany. Some of the most impressive materials fall under the Multimedia heading.

The Multimedia section is also the best place to test the limits of your hardware. While the basic Nautilus shell requires only about 2MB of RAM to run (it needs more under System 7), some multimedia features require 5MB or more. I bumped up against the walls of my 8MB machine in the middle of one animation extravaganza.

The overall quality of Nautilus is very high, but it's uneven. Some articles and notes are poorly edited. Some actions produce cryptic error messages. Some programs work only when launched from the Finder. Some provide no direct path back to the shell. The shell is compatible with System 7, but much of the material included in each disc is not.

All in all, Nautilus feels less like a magazine than an online service. In fact, it even includes a feature called Nautilus Link that provides nearly automatic two-way communication (similar to AppleLink) with Metatec via an 800 number. Much of the material on each disc is solicited from subscribers, so there's a bit of the same community spirit you find on BBSs.

The CD ROM format of Nautilus makes it less up-to-the-minute than America Online or CompuServe, but it also takes away the pressure that comes with those services. There's no need to download files before exploring them, and there's no meter running while you browse. At a price of about $12 per month, Nautilus is an incredible value. Sign me up.

—GEORGE BEEKMAN

Network Monitoring and Mapping Tools

PhoneNet Manager's Pack

PROS: TrafficWatch works on any AppleTalk network. **CONS:** Expensive; no packet analysis; AppleTalk only; needs manual on network management. **COMPANY:** Farallon Computing (510/596-9000). **REQUIRES:** Mac SE; System 6.0.4; AppleTalk. **LIST PRICE:** $1895.

FOR A LONG TIME, APPLETALK network managers had few tools for diagnosing networks. Farallon's new PhoneNet Manager's Pack includes TrafficWatch II, NetAtlas, CheckNet 2.0, NetStats, Timbuktu 4.0, StarCommand 2.1, and Dantz Software's Retrospect Remote. While this is an interesting collection, it doesn't solve all of a network manager's problems.

NetAtlas polls the entire network and draws a map of zones, network numbers, and nodes. Unfortunately, the map is drawn to only one scale—on a large network even a 21-inch monitor won't help. Working from the graphical view, it's difficult to poll devices with echo packets or to get device info, mainly because you must scroll to different parts of the network to select devices. Recognizing this, NetAtlas also presents a text list of all network devices, which can be sorted by name, network number, AppleTalk file version, and so on. The list is much easier to use for selecting devices.

NetAtlas enables you to save maps for reference. Then, when something goes wrong on the network, you can compare the most current map to an old one—the differences might isolate the problem. Farallon includes a NodeHint INIT that forces a Mac to register the same node number each time, but even that doesn't solve all the problems of a dynamic network.

TrafficWatch II, which far outclasses its predecessor, can now monitor traffic on LocalTalk, EtherTalk, and TokenTalk networks. TrafficWatch II's display can be set to show which AppleTalk Phase 1 and Phase 2 packets are being used on the network, but it cannot examine the contents of the packets.

As with the original version, TrafficWatch II includes a series of Excel macros to further analyze data. You can set TrafficWatch II to save traffic files every *x* minutes and then analyze the network's performance over hours or days using those files and the Excel macros. TrafficWatch II cannot collect network traffic across routers. If you want to see the entire internetwork, you have to run TrafficWatch II on the Macs in each network.

CheckNet 2.0 lists all AppleTalk devices, even across zones, and presents a list of the device names, network addresses, and zone names. It is a handy, easy way to check who and what is connected to the network.

The NetStats DA is new. It monitors LocalTalk traffic only within a single network and therefore is of limited use.

Last, the Manager's Pack includes Timbuktu, StarCommand, and Retrospect Remote. Timbuktu is useful for training and setting configurations on a "headless" server (a Mac II without a monitor). A large network probably already has Farallon StarControllers and its companion software, StarCommand. And since StarCommand only works with Farallon StarControllers, it's of no use to anyone without StarControllers. And Retrospect Remote is a good backup program.

Is the whole worth more than the sum of its parts? Farallon claims you can save money by buying the pack rather than buying individual items. But network managers don't regularly use all the items included in the pack. I think it makes more sense to purchase only the tools you need. Of those included in the Manager's Pack, I recommend TrafficWatch II, CheckNet, and for some managers, Timbuktu, as well as Retrospect Remote. Buy those, and you'll still save money.—DAVE KOSIUR

Paintball Simulation Game

Splat'ers 1.01

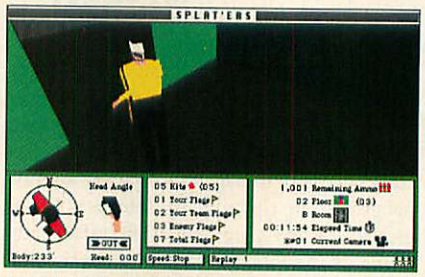
PROS: Exciting; 3-D animation adds reality. **CONS:** Runs in 16 colors only; limited game options. **COMPANY:** Bullseye Software (702/831-2523). **REQUIRES:** Mac SE/30 with color board; color monitor; System 6.0.7. **LIST PRICE:** $69.95.

SPLAT'ERS PROVIDES FOR PAINTball, or splatball, enthusiasts what XOR Corporation's MacSki offers skiers: armchair excitement. For the uninitiated, paintball is an indoor-outdoor team sport in which players use CO_2-powered handguns or rifles to shoot their adversaries with .68 caliber gelatin-encased rounds of paint. Players decide what objectives will constitute victory—capture of a flag or fort, elimination of all opponents, and so forth. Splat'ers uses an indoor setting and a maximum team of 16 members (including the player). Unlike real-life paintball, Splat'ers' objective isn't variable; the goal is to get all the flags, and get them back onto the roof.

Most aspects of Splat'ers are customizable: team size, available ammunition per team, number of hits before elimination, the length of time dead players stay down, fire rate, and the amount of time it takes computer-controlled team members to recognize targets. Before beginning, you set how many flags and floors there will be in the building where the battle is set. Four elevator shafts lead from the roof to the lower levels; there can be up to ten floors, each having four rooms. Floor plans and flag positions are variable.

Then you begin the game, positioned on a roof and facing a member of the yellow team (your team is red). An invisible referee holds a coin toss, and the winner chooses whether to enter the playing area first or second.

When the Yellow Jackets capture your flags, you can regain them by taking them off dead men. The game is over when all the flags are in one team's possession and carried back onto the roof.



Excedrin Headache #5 When my field of vision tumbles end over end as my head flies, I know I'm dead. Now the computer-controlled Yellow Jacket can take my flag, run, and possibly win the game.

You use the mouse to control your gun and field of vision; movement through the building requires a bewildering array of 21 keyboard commands. I wondered just how fun a game with that many key commands would be, until I saw my first Yellow Jacket. Breath quickening, pulse racing, I pursued, shooting until I blew his head off—literally. It flew spinning into the air above his shoulders. How gratifying!

The main movement keys are grouped for use with one hand, leaving the other free for the mouse. I'd like to see future versions of this game implement common Mac key commands. I tried saving games with ⌘-S and instead found my player crouching, and using ⌘-Q to quit only made him spin to the left. A stand-up card provided in the box lists the key commands for movement, which is helpful, but the flip side gives a rather pointless synopsis of the game. A description of game variables would have been much more useful.

You have to remove the game before doing any maintenance on your hard drive—a minor annoyance. The requirement for a color monitor is a severe limitation. But the thrill-of-the-hunt action is great fun. All in all Splat'ers is exciting, whether you're a paintball player or not.

—SUZANNE COURTEAU

Music Education CD ROM

Johannes Brahms, A German Requiem

PROS: Beautiful music; easy installation; generous selection of additional examples of music; insightful music commentary; color. **CONS:** Nonlinear (hypertext) approach leads to some repetition; incompatible with ATM; requires 5MB of free disk space. **COMPANY:** Warner New Media (818/955-9999). **REQUIRES:** Mac Plus; System 6.0.5; hard drive; CD ROM drive; headphones or stereo system. **LIST PRICE:** $66.

JOHANNES BRAHMS, A GERMAN Requiem, is Warner New Media's third CD ROM title. Its subject is one of the masterpieces of Western music, and it follows the format of all music CD ROM packages to date: a performance of the work on compact disc (two discs, in this case) accompanied by HyperCard stacks offering real-time, measure-by-measure music commentary.

On a color monitor, a field of pastel flowers appears behind HyperCard, and the cards themselves are a pleasant ivory color with dark-blue type and graphics. Period illustrations, from pastoral scenes to portraits, enhance the text. A generous 73 minutes of additional audio examples—from Bach, Beethoven, and Bartok to the Navajo Night Chant and Brahms's own voice (recorded on a cylinder in 1869, a year after the *Requiem*'s premiere)—can be played at appropriate points in the text or from a sound-clip index. Unfamiliar terms appear in boldface and lead to glossary entries that may lead to pronunciation guides, additional examples of music, and/or essays on related topics.

The performance, by Robert Shaw and the Atlanta Symphony Orchestra and Chorus with Arleen Augér and Richard Stilwell, is a digital recording that has received critical praise. You can listen to it while viewing any of five play-through commentaries—a basic (mostly verbal) musical analysis, a more in-depth analysis (which doesn't shy away from musical notation), a German transcript of the text, an English translation, and a set of conductor's notes. You can switch from one commentary to another at any time, and for recording your own thoughts, there is a set of blank cards synchronized with the music.

A German Requiem also contains interesting and helpful excursions: a brief biography of Brahms; an overview of the requiem as a musical form; essays on the music of romanticism and the social and political conditions of the romantic era; a series of lessons in music theory; and discussions of the musical themes used in the *Requiem*, the derivation of the text, Brahms's creative invention, and so on. Some of these side trips are rather dry and pedagogical (in contrast to author Robert Winter's humorous and enthusiastic writing style in the Voyager Company's competing CD Companion Series), while others combine compelling graphics, musical notation, text, and sound in a way that my music teachers could only dream of.

A German Requiem is easy to install, a (strangely silent) guided tour illustrates how to navigate within the program, and HyperCard is provided. A German Requiem requires 5MB of hard drive space, and you'll have to turn off Adobe Type Manager to avoid display problems. There are some factual errors and display glitches (none serious), the volume level of sound clips is not uniform, and the hypertext format makes for more repetition and less cohesiveness compared with Voyager's CD Companion titles.

Brahms's *Requiem* is Brahms and romanticism at their best. Don't let the work's title deter you; Brahms composed an optimistic antidote to grief, not a morose and lifeless morality tale. Whether or not you are familiar with classical music, Brahms's *Requiem* is a moving, radiant work.

—ROBERT C. ECKHARDT

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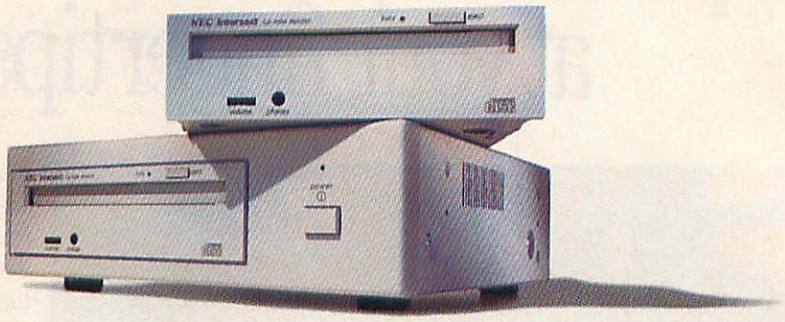
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C&C Computers and Communications

Circle 180 on reader service card

NEC

Crushing Competition

BY DAVID POGUE

IMAGINE THIS: YOU WANT TO back up a file, but it's too big to fit on a floppy. Or you finally got a PowerBook, but the hard drive only holds 40MB, and you're out of hard drive space in a week. Or you have to send a medium-size file via E-mail, but you're afraid it'll take forever.

What you need is a file-compression program. The beauty of these programs is that they let you toy with one of life's great equations: Time = Money. If you're willing to wait while a compression program encodes files into a more compact form, suddenly you no longer need to purchase a new, expensive hard drive; your old one can hold twice as much. And these programs can compress any kind of file or application, not just graphics (see "Image Compression Matures," in this issue).

Version after version of these miraculous programs have been pouring from the offices of tiny software companies. The archivers (StuffIt, Compact Pro, PakWorks) are applications; they produce *archives*, which are like suitcases containing individually removable compressed files. The disk-space maximizers (DiskDoubler, SuperDisk) are geared toward fast, easy file crunching for the sake of increasing the free space on a hard drive; they usually work right in the Finder.

StuffIt Deluxe 2.0.1

STUFFIT, THE ORIGINAL ARCHIVER, was such a shareware hit that it became a commercial product. The Deluxe version (Aladdin Systems, $99.95) added a staggering array of features to its progenitor: government-standard password protection, a Finder menu with commands for stuffing and unstuffing, and the ability to decompress BIN and ARC files from IBM computers. But StuffIt Deluxe has lost the simplicity of the original. In fact, Deluxe's Installer program plants a whopping 1.5MB of software on a hard drive (including 47 support files)—an ironic touch in a program that's meant to make files smaller.

It has a scripting language for automating compression, offers built-in virus detection, and lets you slip individual files back and forth between archives. In raw performance terms, though, StuffIt Deluxe is a poor contender; it was one of the slowest and least-efficient participants in my tests (see "Fast and Tight"). StuffIt Deluxe is worth its installation hassle only for hard-core archivers, people who have to share with DOS PCs, and the security-conscious.

StuffIt Classic 1.6

WHEN ALADDIN CREATED STUFFIT DELUXE, it was forced to adopt a new file format that was incompatible with the original StuffIt. To avoid shutting out thousands of shareware users, Aladdin released a shareware version of StuffIt Deluxe, called StuffIt Classic ($25), with much of the excess stripped away. (StuffIt Classic isn't the same thing as the real classic StuffIt, now known as StuffIt 1.5.1, which you can now forget, and Aladdin is changing the name of StuffIt Classic . . . to StuffIt Shareware.)

StuffIt Classic/Shareware shares the new file format of StuffIt Deluxe; now you can enjoy the same not-so-hot speed and compression power as the commercial product's without having to buy the whole enchilada. You can get it from an online modem service or a user group. Either way, it's a good deal if you can live without the esoteric features of StuffIt Deluxe—special compression-optimizers for sound and Photoshop files, the scripting language, and the DOS-file openers, for example. There's no rush; the millions of downloadable files on America Online and CompuServe will stay in the original StuffIt 1.5.1 format for some time. (Deluxe and Classic open the old archives, but 1.5.1 won't open the new ones.)

Compact Pro 1.32

BILL GOODMAN WROTE this shareware file-squeezing application ($25); it was the first serious challenger to the original StuffIt because it was much faster. Even today, Compact Pro's speed beats the pants off StuffIt Deluxe's Better compression mode, which produces equivalent-size archives.

Compact Pro offers many of the features that made StuffIt popular, such as the ability to extract individual files from an archive, read DOS archives, and break up huge files into floppy disk–size chunks. But Compact Pro packs them neatly into a more streamlined and intuitive interface. Like the StuffIt siblings, Compact Pro can also make *self-extracting archives*, or SEAs, which decompress when double-clicked. (SEAs are incredibly handy because you don't need any special program to unpack them; virtually every compression program can make an SEA out of an archive, which adds from 7K to 14K to its size.)

Compact Pro can also unstuff old-format StuffIt archives, and it comes with a superlative manual on disk. It also retains the title of Best Squeezer—no other program produces smaller archives. The speed-to-size trade-off is considerable, however; Compact Pro's speed is near the bottom of the heap.

DiskDoubler

THIS IS ONE ELEGANT PACKAGE (Salient Software, $79.95). It's an extension that puts a menu on the Finder menu bar, whose commands include Compress and Expand. When you choose Compress, DiskDoubler zippily shrinks any selected folder or file—in my tests, by an average of 50 percent. (Only Compact Pro did better—averaging 57 percent—but it took five times as long as DiskDoubler.)

DiskDoubler's features are compactly arranged in its single menu: you can create SEAs; combine multiple files into a single archive (but you can't extract one at a time); segment a big file onto several floppies; and even copy files from one place to another, in half the time it would take the Finder to copy them. All of this takes place right on the desktop, and DiskDoubler runs happily in the background.



File-compression utilities get bloodthirsty for kilobytes

Best of all, you can open DiskDoubler files just by double-clicking; they decompress and open simultaneously. Their names even show up in the list box when

continues

you use any program's Open command; once again, just double-click to open, without making a trip to a compression program. You can even set DiskDoubler to recompress files automatically when you're done with them.

Although DiskDoubler generally preserves files' icons when it crunches them (adding a tiny DD stamp in the corner), it changes their file types; alas, that means that certain utilities (such as On Location or Disinfectant) can't read their contents. Nonetheless, with its impressive safety features, extremely tight compression, and respectable speed, DiskDoubler is a must-have for anyone who could use more hard drive space.

SuperDisk 1.7.3

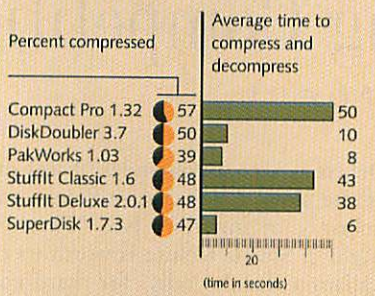
THIS CONTROL PANEL DEVICE TOO is designed to squeeze more megabytes out of your drive (Alysis Software Corporation, $89). To specify a file you want SuperDisk to shrink, you append .s to its name. That's not quite as convenient as using a menu command, and adding suffixes to file names feels a little DOS world–ish. On the bright side, you can append .s to a folder's name, and anything you drop (or save) into it is immediately compressed. And .s-named files automatically expand and open when double-clicked; no trips to an application are ever necessary to stuff or unstuff.

There are some significant advantages to SuperDisk. First, it's the fastest compression program there is—about 40 percent faster than DiskDoubler—and the amount of compression is respectable (it averages about 47 percent). Second, SuperDisk doesn't change a file's file type. That is, to the Mac, a compressed Word file is still a Word file. That means you can compress all kinds of things, like supplementary files (dictionaries for Word, say, or After Dark modules)—and the application will never know the difference; when it needs those files, they automatically decompress. And utilities like Disinfectant and On Location work fine with SuperDisk-squished files. Finally, SuperDisk is the only way to go for compressing applications; they expand into temporary files when double-clicked, so they don't take any time to recompress when you quit.

But SuperDisk has disadvantages, too, and a bunch of quirks. There's no way to halt a compression in progress, and it doesn't run in the background. Compressed files dragged from one disk to another annoyingly expand and then recompress.

Worse, some of SuperDisk's speed comes at the expense of data safety: in the Finder, SuperDisk actually deletes a file before saving the compressed version. If the Mac's power goes out, your file says adios forever. And SuperDisk is the only compressor on the market that doesn't check for data integrity (technically, it doesn't use a *checksum*). In other words, it doesn't warn you when you open a file that's somehow been corrupted in the compression process.

Fast and Tight



These tests were conducted using a suite of 17 files, ranging in size from 11K to 1400K. They included applications, Word files, graphics files (4 types), a sound file, a spreadsheet, a font, a dictionary, a stack, and so on. This table shows the average amount of compression, and the average total time it took each file to compress and decompress. You can download the table of results for all 17 test files from the Macworld forum of America Online.

The test computer was a 4MB Mac IIfx with a freshly defragmented Quantum hard drive. DiskDoubler's Verify feature was on (the default), SuperDisk was in Tighter mode, and StuffIt Deluxe was set to its default Fast compression mode.

PakWorks 1.03

THIS TINY 65K PROGRAM (SMALL Miracles, $79.95) will remind you of Compact Pro. But where Compact Pro squeezes slowly but tightly, PakWorks is fast and loose: a blindingly quick compressor that doesn't shrink files as much. In my tests, PakWorks compressed files by an average of 39 percent (compared to Compact Pro's 57 percent), but in about ⅙ the time.

PakWorks offers most of the standard features: it can make SEAs, split large files into smaller pieces, and password-protect any archive. (But PakWorks doesn't open StuffIt 1.5.1 files, doesn't run in the background, and doesn't do the DOS-file thing.) You can also tell PakWorks to zap a whole folder, or a whole disk, down to size, but to leave certain file types alone.

When you install the provided INIT, PakWorks handles compressed applications much as SuperDisk does: when you double-click on a compressed application, PakWorks expands it (to a temporary file) and launches it. When you quit, PakWorks deletes the expanded copy instantly, leaving you where you started—with a compressed application on your disk.

As an added bonus, by the time you read this, PakWorks will come with a special 10K INIT, called PakStar, that treads on SuperDisk turf. If you put an asterisk at the end of any file name, PakWorks instantly compresses that file; as with SuperDisk, you need only double-click on the file to open it.

The Upshot

IT WOULD BE HARD TO IMAGINE A smoother, more trustworthy performer than DiskDoubler. Not only is it among the top speed and efficiency performers, but it's utterly safe for your data. It even expands old-style StuffIt files, so you can use it to unstuff stuff you download while using your modem.

Of the archiving programs (which let you add and remove individual files to an existing archive), Compact Pro is still the handiest; it reads vintage StuffIt files, and it offers tight compression and, relative to StuffIt, good speed. Of course, if you don't need to open StuffIt files, and if tightness of compression isn't paramount, go for speed king PakWorks.

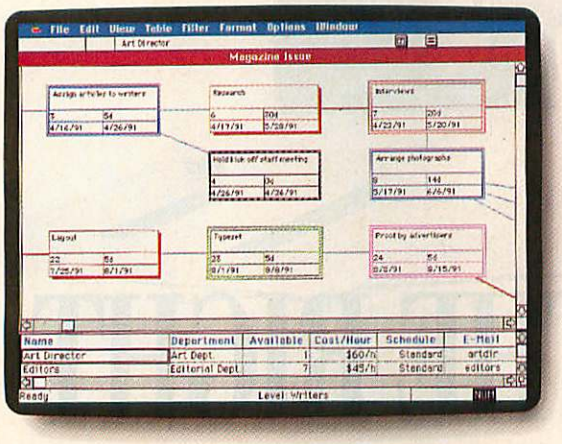
The Smaller, Faster Future

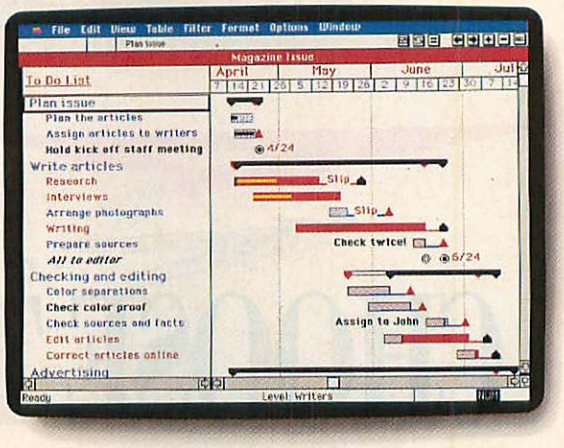
THE WAVE OF THE FUTURE SEEMS TO be automatic background compression. As you read this, three programs should have appeared that all break this same ground: SpaceSaver (from Aladdin, the StuffIt people); AutoDoubler (from Salient Software, the DiskDoubler folks), and More Disk Space (from Alysis, the SuperDisk gang). They lurk in the background, automatically compressing your least-often-used files during the moments you're not working. All three companies boast—and early prototypes indicate—that the new products are sizzlingly fast and effortless to use.

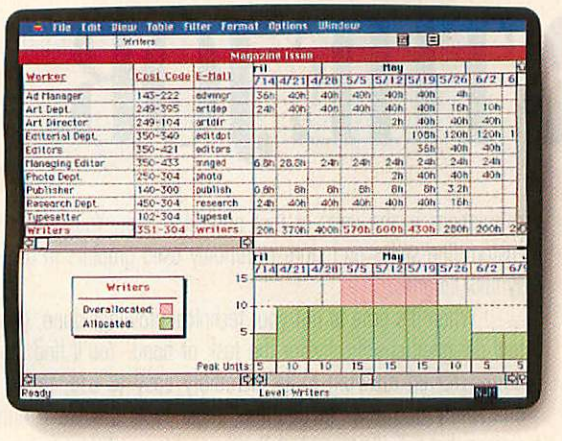
SpaceSaver will be sold separately and will also be bundled with StuffIt Deluxe 3.0, which, according to Aladdin, will be much simpler and faster than its forerunners. And Salient plans to soon release DiskDoubler 3.7.2, which, if used with Auto Doubler, offers a dramatic speed increase; tests of a prerelease version prove it to be faster than any product now available while still creating small files. These developments, in addition to the dekinked SuperDisk 2.0 and the PakStar INIT, should make 1992 the Year of the Tight Squeeze. ■

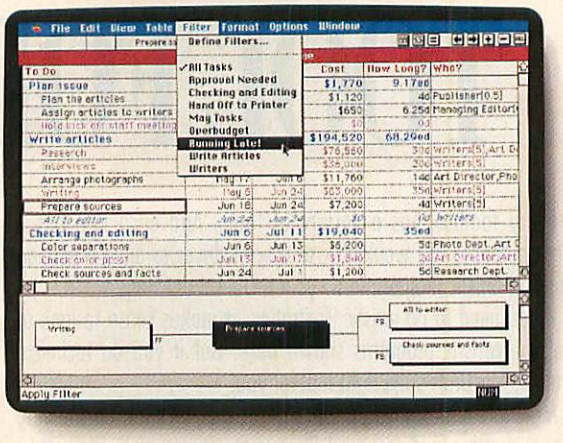
Having ridden the New York City subway at rush hour, contributing editor DAVID POGUE considers himself an expert on compression.

Before you start your next project, check your options.

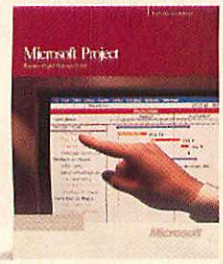








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Circle 129 on reader service card

New Products

The Latest Macintosh Releases

EDITED BY EVAN COOPER

THIS SECTION COVERS MACINTOSH PRODUCTS FORMALLY ANNOUNCED BUT NOT YET EVALUATED BY MACWORLD. ALL PRICES ARE SUGGESTED RETAIL. PLEASE CALL VENDORS FOR INFORMATION ON AVAILABILITY.

HARDWARE

APS DAT 2Gbyte Portable

SCSI DAT drive with capacity of up to 2GB when using 90-meter tape (accepts 60- or 90-meter tape). The drive is based on the Archive Python 3½-inch DAT mechanism with a data-transfer rate of up to 11MB per minute and a mean time between failures of 40,000 hours, company claims. Has a 1MB buffer and uses the SCSI-1 or SCSI-2 interface. Ships with Ret-



APS DAT 2GbytePortable

rospect archiving software by Dantz Development.Two-year warranty. $1499. Alliance Peripheral Systems, 816/478-8300, 800/235-2752; fax 816/478-4596.

AT-MR460T and AT-MR860T

Lightweight, multiport Ethernet repeaters designed to be mounted in ceiling, with embedded transceiver for accepting thick or thin coaxial cable. Replaces AUI ports with coaxial Ethernet transceivers and allows connection directly to a backbone using included coaxial tap or BNC connector. Nodes are connected with unshielded twisted-pair telephone wire. Each node can be up to 100 meters from backbone tap. Four-port 460T $795; eight-port 860T $895. Allied Telesis, 415/964-2771; fax 415/964-1598.

CY-2000

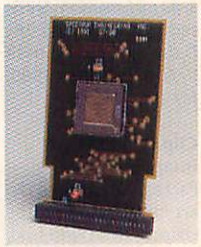
Magneto-optical, plug-and-play disk drive with 1GB capacity. Stores data on double-sided optical platters that are erasable and rewritable. Offers 35ms average seek time and a 10Mbits-per-second average transfer rate, according to company. Available in tabletop and rack-mount models. Prices start at $5000, depending on configuration. Contemporary Cybernetics, 804/873-9000; fax 804/873-8836.

EN/SC-10T

External Ethernet adapter that connects any Macintosh—including PowerBooks and Quadras—to 10BaseT network via SCSI port. Device is designed especially for Macs without adapter slots; it offers connections for thick, thin, and twisted-pair wiring, and has two SCSI ports for daisy-chaining. $399. PowerBook cable must be ordered separately for $50. Asanté, 408/734-4844; fax 408/734-4864.

FPU-882

Floating-point-unit (FPU) board with clock speed of 16MHz, for Classic II; designed to fit in FPU/ROM expansion slot on main logic board. Board requires no software and is accessed directly by applications that require, or benefit from, the added speed associated with a math coprocessor. $175.



FPU-882

Newer Technology, 316/685-4904, 800/678-3726; fax 316/685-9368.

LaserMatrix 1000

Continuous-form laser printers compatible with the Hewlett-Packard LaserJet II and III. Model 5 uses PCL5 language, and Model 6 uses PCL5 or PostScript. Prints 16 pages per minute using adjustable six-pin tractor feed, with a 3½-inch to 8-inch print area. Handles a variety of jobs, including bar codes, labels, and forms. Has two communication ports, and switches between them automatically when activity is detected. Requires interface cable, not included. $4995. Output Technology Corp., 509/536-0468; fax 509/533-1280.

MIDI-Vanilli

MIDI voice controller that reshapes digitally recorded voice to mimic melodies played on a MIDI instrument. A user can record the voice in monotone, play a melody on a MIDI instrument, and have the MIDI-Vanilli change pitch and volume to make spoken words sound sung. Controller works with any MIDI sequencer or combination of sequencer and digital audio editing software. 2MB min. memory, MIDI interface, and 40MB hard drive required. Price will be about $1500. IMRAN, 212/741-1000; fax 212/741-3577.

Mirror Portrait Display

Monochrome 15-inch portrait display built around Zenith tube, with a screen resolution of 640 by 870 pixels at 80 dpi, and a 75Hz refresh rate. Displays 16 shades of gray when used with built-in video on IIci or IIsi, and 256 shades when connected to Quadra; the company offers 1-bit video board for $150 with



Mirror Portrait Display

purchase of Portrait Display. Monitor has three ADB ports on the back panel and front-mounted control knobs for adjusting the screen. Universal power supply connects to international voltages; emissions comply with Swedish VLF and ELF guidelines. $449. Mirror Technologies, 612/633-4450, 800/654-5294; fax 612/633-3136.

Optix Scanner Interface Board

NuBus bus-master board for attaching high-performance asynchronous scanners for use with the Optix Document Image Management System software. Scanning and compression occur at the same time, so throughput is faster than that of SCSI scanners. Serves as interface for Fujitsu's 309 family of scanners, which are capable of scanning up to 24 ppm. Also supports scanners that emulate the Fujitsu interface. Requires Macintosh with NuBus board. 4MB minimum memory. $1095; Optix Document Image Management System software from $695 for single user and from $30,000 for multiple users, depending on configuration. Blueridge Technologies, 703/675-3015; fax 703/675-3130.

RealTech 19" Trinitron Monitor

A color monitor system with a 19-inch Trinitron monitor and an RT-24 video board. Monitor has a flat cylindrical face and displays 1024 by 768 pixels with a 75Hz vertical refresh rate and a 60kHz horizontal refresh rate. RT-24 board is an accelerated 24-bit color board with SIMM sockets for adding up to 16MB of RAM, and supports 2x and 4x pan and zoom. $2899. Micro Business Solutions, 409/539-3959, 800/972-3018; fax 409/539-4141.



RealTech 19" Trinitron Monitor

ScuzzyView

Display controller weighing 2 lbs. that connects PowerBooks to any Apple monitor, most VGA monitors, Aura's 15-inch and 19-inch monitors, and many LCD panels. Also supports NTSC- and PAL-compatible VCRs and monitors. Screen rendering is offloaded through the SCSI port to graphics processor in device, freeing Mac's processor for other tasks. Under $700. Aura Systems, 619/438-7730, 800/365-2872; fax 619/438-7758.

XGT/ADB Graphics Digitizing Tablet

Digitizing tablet with active area measuring 12 by 12 inches with function keys and user-definable buttons for use with a variety of Kurta input devices. Also has button for selecting airbrush controls, pressure sensitivity ranges, and tablet



XGT/ADB Graphics Digitizing Tablet

and screen scaling modes. Interface kit required to install the tablet; also requires pointing device. Tablet $545; cordless pressure pen $300; cordless pen, 4-button cordless or corded cursors $100 each; corded 16-button cursor $200; interface kit $50. Kurta Corp., 602/276-5533, 800/445-8782; fax 602/276-7823.

SOFTWARE

A La Carte

Desk accessory that lets user select a label anywhere on a sheet of labels for printing. Saves imported label images until user has filled the page and is ready to print. 1MB min. memory. $49.95. Octo Logic, 310/364-2362; fax 213/456-5187.

CareTracker

Patient-care database and decision-support program for health-care providers that tracks standard patient information and allows searching and user-customized reporting. Program can determine for which tests or inter-

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ventions a patient is due, based on rules defined by the user, and monitor and report on drug interactions and allergies; also generates sorted flow sheets for tracking serial results. Has a Bayesian decision-support and decision-tree module and can store and retrieve medical literature. User can look up drugs by generic or brand names; optional DataPak data file on hundreds of diagnoses and medications available. 1MB min. memory. $489; each additional user $199; DataPak $49. Med4th Systems, 414/963-1985; fax 414/963-1985.

Clipart Business Images

Package of business clip art images that can be edited in Aldus FreeHand, Adobe Illustrator 88, or Illustrator 3.0; files can also be imported into any program that reads EPS files. Clip art images include people, computers, equipment, symbols, and hands. 1MB min. memory. $129. Online Arts, 714/794-0013; fax 714/794-9553.



Clipart Business Images

Cliptures Volume 4 World Flags

Collection of EPS files depicting 309 national and civil flags representing all independent nations and many dependent territories, as well as various organizations and international codes. Files are in CMYK and black-and-white outline versions. Because of EPS format, files can be enlarged to many sizes without loss of clarity, sharpness, or detail. 1MB min. memory. $129.95. Dream Maker Software, 818/353-2297; fax 818/353-6988.

DiskAuditor

Application that audits and creates report of all applications, cdevs, and INITs on mounted volumes. Keeps a running inventory (audit trail) of authorized software for each machine audited. Person performing audit can use the delete function to remove unauthorized software from audit trail. 1MB min. memory. 10 machines $79; 25 machines $189; 50 machines $360. Expert Systems, 407/242-0140; fax 407/952-5605.

Eco-Adventures in the Rainforest

Environmental adventure game in which players are sent into rain forest on an ecological assignment and meet gun-wielding poachers, monkey-eating eagles, and natural obstacles as they play against the clock to complete their mission. Players observe the destruction of rain forests and learn ways to help protect them. At the end of each assignment, players attend a press conference to answer questions about what they have learned. Features animated graphics and sound effects. 1MB min. memory. Color version $59.95; black-and-white $49.95. Chariot Software Group, 619/298-0202; fax 619/491-0021.



Eco-Adventures in the Rainforest

FormatterFive

SCSI driver and utility that lets user mount magneto-optical or removable SyQuest drive on desktop and format multiple DOS and Mac partitions on the same cartridge. A test feature identifies data errors and reassigns bad blocks. Versions are available for Hewlett-Packard, MaxOptix, Ricoh, and Sony optical drives as well as for most removable Winchester drives. 1MB min. memory. $150; with DOS Mounter by Dayna Communications $195. Software Architects, 206/487-0122; fax 206/487-0467.

HandiWorks

Integrated application; combines a word processor, a spreadsheet, basic drawing and desktop publishing tools, and a database. User can design documents and save them as templates or use the forms, letters, and memos included. All items in a given document are linked to one another and updated when data is changed. PhoneBook DA stores up to 5000 names, phone numbers, and addresses, and can export data to be merged with HandiWorks documents. Has English and Spanish dictionaries for checking spelling, and a built-in hyphenation program. Dictionaries in 13 other languages are available. 1MB min. memory. $175. MacVonk, 215/660-0606; fax 215/668-4360.



HandiWorks

Imhotep

HyperCard stack focusing on black health issues. Contains data on seven diseases and provides information on their origin, diagnosis, symptoms, treatment, prevention, and outlook. Diseases covered include AIDS, sickle-cell anemia, and lupus. Also includes health glossary and sections on nutrition, exercise, and black health organizations. Animations illustrate the processes and descriptions in stack. Available in black-and-white or color version. 2MB min. memory. $112; quarterly update subscription $22. Afrisoft USA, 213/732-7923; fax 213/732-7923.

Kiwi Power Windows

Window- and document-management utility designed for use under System 7 that organizes Finder and application windows and creates

work sets from groups of files. User can create window layouts or use preset ones, with support for multiple monitors. Work sets allow users to open many documents, applications, and folders at one time and reposition their windows with a single command. Restores view mode in Finder windows. 512K min. memory; requires System 7. $79.95. Kiwi Software, 805/685-4031; fax 805/968-1932.

MacDINE II
Helps user create nutrition and fitness programs using food records, physical-activity records, diet analysis, and a scoring system. Program's database contains calorie count and nutrient levels for 5656 brand-name, generic, ethnic, processed, and fast foods. Recipe analysis and food search features aid user in planning meals and diets. 1MB min. memory. $299. DINE Systems, 716/688-2492; fax 716/688-2505.

The Mac Software Registry
FileMaker Pro database with information on more than 3900 software titles and 1400 vendors. Each entry lists the minimum system requirements to run software; System 7–compatibility; retail prices; update info; and known bugs and anomalies. Has keywords for searching by software function. Also provides toll-free, fax, direct, and technical-support phone numbers and E-mail addresses. 1MB min. memory. $179; subscription renewals for one year $99; QuickDex database with only vendor information $29. Mac Software Registry, 914/961-8743; fax 914/793-3739.

On The Air
Software for creating presentations that incorporate animation, still images, and sounds, which can be created in the program or imported from a variety of sources. Uses drawing tools similar to those of popular draw packages. Path-based animation controls allow animation speed, duration, rotation, and transition effects to be


On The Air

applied using slide-bar controls, calibrated in seconds or percentages. Objects' appearance, disappearance, and motion are controlled in similar manner. Playback control panel can output presentation to multiple screens, reserving one monitor as control station. Imports PICT, PICS, SND, Scrapbook, and other file formats. 2MB min. memory. $175. Meyer Software, 215/675-3890; fax 215/675-3873.

RussianH Cyrillic PostScript Font
Sans serif Cyrillic font designed to match weight, height, and style of Helvetica on a PostScript printer. Includes software for changing the keyboard layout and a one-step installation utility that eliminates the need to use Font/DA Mover. Keyboard layout matches Cyrillic characters with their approximate Roman equivalents. $75. Bersearch Information Services, 303/674-8875, 800/859-0289; fax 303/674-2860.

SimAnt
Simulation game that lets player control an ant colony in a suburban backyard, and try to drive the resident human out of his house. To reach the goal, user must control one ant and supervise up to 1500 other ants so that population expands; player commands worker and soldier ants to gather food, dig tunnels, care for eggs, and defend against other insects. Game can be viewed in cross section,


SimAnt

surface view, or global view, and has four levels of play. HyperCard-like windows provide information on ant behavior and hints on game. 1MB min. memory. $59.95. Maxis, 510/254-9700; fax 510/253-3736.

The System 7 Pack
Package of three utilities for use with System 7. Finder 7 Menus lets users change, add, and delete ⌘-*key* combinations in Finder's menus. Rename Delay Editor changes the delay between when an icon's name is clicked and when the name can be edited; the delay can also be omitted entirely. Application-Document Linker lets user change default application for opening documents for which creating application is not found and establish program links. System normally uses TeachText as default. 1MB min. memory. $29.95; for registered users of any other product by company $19.95. Insanely Great Software, 908/549-0590.

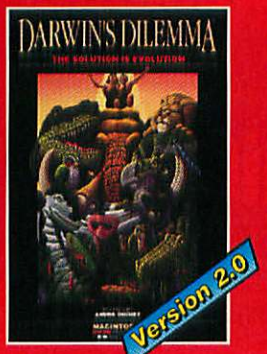
System 7 Training Series
Two System 7 tutorials: Converting to System 7, which includes two courses, for experienced System 6 users; and Getting Started with System 7, with three courses, for users new to the Mac. Each comes with audiocassettes and disks, command-summary card, and exercise card. Packages include 90-minute tutorial and require System 7 and a cassette tape player. Converting to System 7 starts with basic features of System 7 and then covers advanced techniques. Getting Started with System 7 begins with section on Mac environment and later covers System 7.
continues

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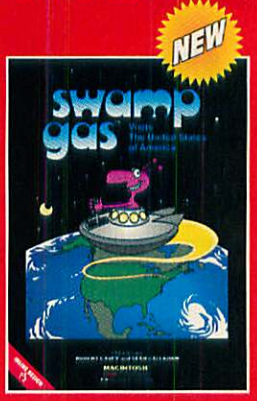
3 in Three, by Fool's Errand author Cliff Johnson, an animated full-color adventure that shows you a side of your Macintosh that you never imagined.
★★★★★ -MacUser 10/91



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TimeLog
INIT continuously monitors and records computer usage, noting duration that each document and application is active. Logs computer usage, and shows time spent in user-specified folders and files, and relative percentages of time spent in files and folders. $97. Coral Research, 702/588-9690.

Trapping Tutorial Disk
Interactive tutorial, developed in MacroMind Director, that teaches the basics of trapping including what it is, why it is needed, when it is necessary, and how to do it. Includes Player version of Director. For $1500, company customizes disk for service providers to include a company logo at the beginning of the tutorial, information on its equipment available, and a checklist for clients submitting jobs. Requires 13-inch or larger color monitor and 4MB min. memory. $19 plus s/h. Pixel Ink Consultants, 415/564-0962; fax 415/564-9677.


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VideoShop
Environment for sequencing, displaying, and manipulating moving images and audio for use in applications that support QuickTime. Lets user view and arrange video clips; sequence video, animation, graphics, and sound; and add visual effects such as fades and wipes. Resultant movies can be played on screen or exported to videotape, with proper board. With video-capture board, user can store video on hard drive. VideoShop creates a micon, or movie icon, for each clip, allowing user to preview a clip before opening the file. Requires QuickTime-compatible Mac. 4MB min. memory. $595. DiVA Corp., 617/491-4147; fax 617/491-2208.



VideoShop

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Word Hunt
Educational program designed to improve vocabulary using three word games—Flash 'em I, Flash 'em II, and Word Hunt. Games resemble "Wheel of Fortune" and tic-tac-toe. Program includes word set with more than 3500 SAT-type vocabulary words, and Smart Editor, a module that lets user create and use custom sets or import them from word processor files. 2MB min. memory. $49.95. HyperSolutions Software, 415/381-2545.

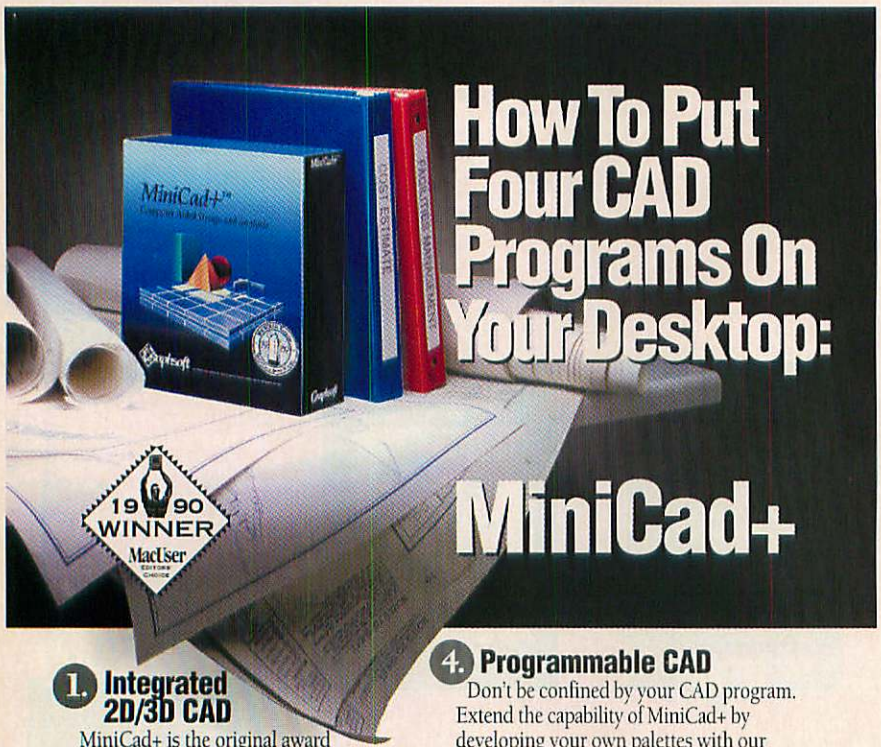
CD ROMS

CCInfodisc
Series of six compilations, each with over 1 million pages of information on occupational health and safety, that are updated quarterly. Extensive navigation capabilities and on-screen contextual help aid record searching. Information on discs includes more than 45 occupational health and safety databases. Price of updates is included in purchase price. 1MB min. memory. Single user $250 to $300, depending on CD; network version $500 to $2500, depending on number of users. Canadian Centre for Occupational Health and Safety, 416/572-4444; fax 416/572-2206.

FoneFonts
Contains more than 1450 Type 1 PostScript typefaces, including the Monotype and Adobe type libraries, and 33 typefaces from The Font Bureau. Ships with Font Browser, a utility for finding and previewing typefaces. CD ROM is locked, and purchasers must call Monotype or type dealers to purchase the fonts; after payment is made, the dealer provides access codes. User can buy individual fonts, families, or entire libraries. Eight typefaces $49.99; prices for additional typefaces vary according to number purchased. Monotype, 312/855-1440, 800/666-6897; fax 312/939-0378.

Learn To Speak English
Language course built around narrative of a man who visits the US. Program's 30 lessons emphasize understanding the spoken language. User responds to common situations using full English sentences. Available in English, Spanish, French, and Japanese versions. Stack for navigating course and controlling CD ROM. 1MB min. memory. $99. HyperGlot, 615/558-8270; fax 615/588-6569.

Rick Doyle Digital Imagery Volume 1
Collection of 64 photos of professional water sports and tropical scenery, in 24-bit TIFF and gray-scale formats. Volume 1 is the first in a series of discs. Photos produced by professional photographer Rick Doyle. Images are

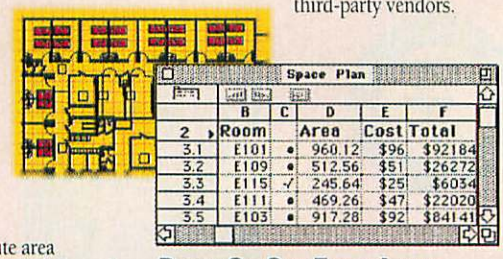


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stored in Mac and PC formats and come with unlimited reproduction rights if photographer's credit is given. Images may not be resold for commercial purposes. $79.95. Rick Doyle Action Photography, 619/481-6792; fax 619/481-6792.

ACCESSORIES

CompUnite
Modem cable that connects a high-speed or standard modem to a Mac. Works with 2400 MNP, 9600-bps and higher-speed modems, and is compatible with most communications packages. 6-foot cable provides hardware handshaking required for high-speed modems. $14. Celestin Company, 510/835-0702; fax 510/465-4991.

How To Operate the Macintosh, System 7
Training course recorded on four audiocassettes that takes users step-by-step through basics of Mac system, advancing to more complex features of System 7. Also includes data disk with practice files to use with tutorial, and indexed quick-reference guide. Requires audiocassette player and 1MB min. memory. $125. One-On-One Computer Training, 708/628-0500, 800/424-8668; fax 708/628-0550.

LitePro and LitePro LS
Line of high-resolution, portable LCD color projectors for giving presentations. LitePro includes color LCD panel, light source, and projection unit and connects to Mac through graphics card. LitePro LS has remote control and built-in LiteShow II unit that captures to floppy disk and plays back more than 30 images from computers running Macintosh Operating System, DOS, OS/2, and Windows 3.0. Both units can be installed in rear projection booths; each weighs 19 lbs. and has a 400-watt light source. LitePro $6995; LitePro LS $8495. In Focus Systems, 503/692-4968, 800/327-7231; fax 503/692-4476.


LitePro and LitePro LS

MagentaCase
Cordura nylon and foam carrying case for Macintosh PowerBooks designed so computer can be used while in case. Pockets and pouches for accessories can hold power pack and up to five batteries. Comes in black or dark gray. Owner is entered in company's lost-and-found registry, and notified if lost computer is found. $85 plus s/h. Magenta Seven, 919/787-2787; fax 818/787-1277.

Series 20
Universal bar-code and magnetic-stripe decoder with front-panel jacks for up to two bar code input devices. Reads multiple bar-code and magnetic-stripe formats, discriminates among 13 different bar-code symbologies, and automatically recognizes the type of host machine to which it is connected. Data-input editing feature lets user customize scanned data before it reaches targeted application. Full keyboard support allows user to encode any key. $640. Percon, 503/344-1189; 800/873-7266; fax 503/344-1399.


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Vision Vu Computer Workstation
A clear acrylic stand for placing copy in front of a computer workstation, designed to eliminate awkward head and neck movement. Works with any computer that has a detachable keyboard. The user can adjust the height of the monitor and copy-holder; the device accommodates a variety of paper sizes. 14-inch model $84; 18-inch model $89. Vision Vu, 903/593-4666, 800/678-2629; fax 903/510-2978.


Vision Vu Computer Workstation

BOOKS

10 Minute Guide to the Mac
Designed to teach new users to perform basic Mac tasks. Lessons focus on the basics of desktop, file management, HyperCard, and customizing the system. Teaches how to build file directories, use a mouse, type and edit on the Mac, and organize the system. Covers all Mac models. Written by Stephen R. Poland. $9.95. Sams, 317/573-2500, 800/428-5331; fax 317/573-2583.

Monotype Desktop Solutions
Design packages, reference guides, and Monotype PostScript typefaces to help desktop publishers produce professional-quality publications. Packages available are Reports and Presentations, Forms and Catalogues, and Newsletters and Booklets. Documentation has design tips and techniques, guidelines for charts and illustrations, recommended typefaces for each category, and info on publishing terms and print production. Update with TrueType fonts is planned for early 1992. $179 per package. Monotype Typography, 312/855-1440, 800/666-6897; fax 312/939-0378. **m**

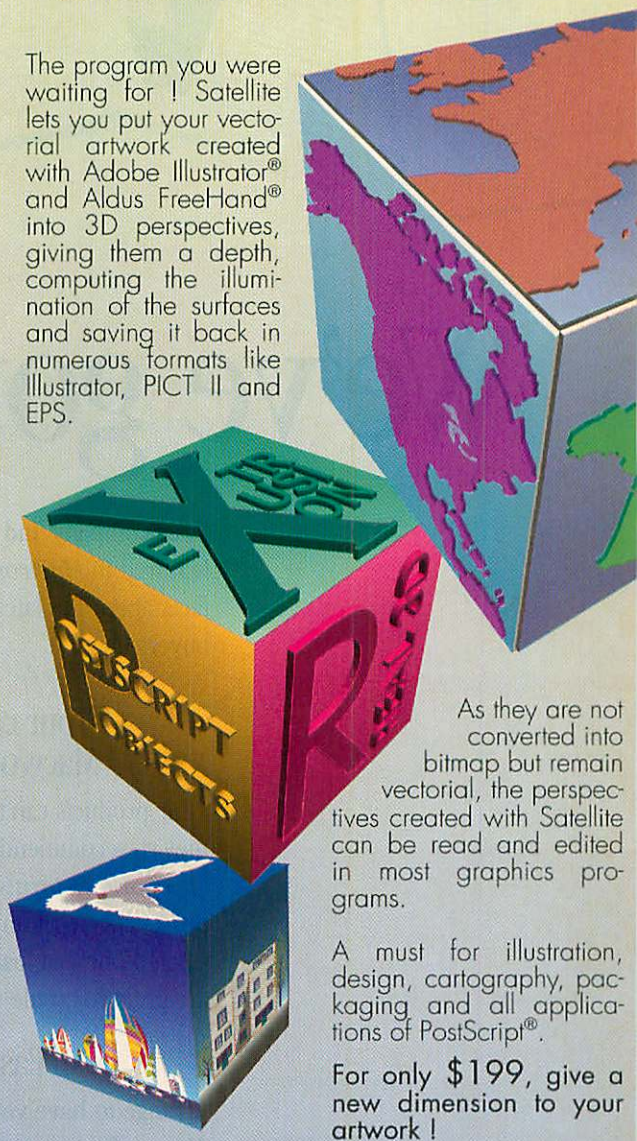
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MACWORLD

Quick Tips

BY LON POOLE

IN JANUARY 1991 I RECOMMENDED the booklet *An Introduction to Digital Color Prepress* (Agfa Corporation, 1990) to anyone looking for an elegant and informative introduction to color publishing using PostScript-based systems. A new 32-page sequel, *Digital Color Prepress, Volume Two* (Agfa Corporation, 1991), focuses on reproducing images with color halftones. Its concise text and many informative illustrations further explore several topics introduced in the first booklet and explain other arcane subjects such as sharpening filters, color correction, telecommunications, compression, and color proofing. Sadly, the new booklet is not free, unlike the first one. You can order single copies for $10 plus tax and shipping (quantity discounts are available) from Agfa (800/395-7007).

Buying RAM

Q I am considering upgrading the RAM in my Macintosh LC from 2MB to 10MB. I am confused by the number of sources for RAM, all of which claim to have the best product. Purchasing the memory from Apple seems to be a safe alternative; however, this would be one of the more expensive solutions. Also, Apple's warranty period is shorter than that of many of the other sources. Can you give me a crash course in RAM savvy, so I can make an informed purchase?

Richard J. Terpstra
Kentwood, Michigan

A APPLE DOESN'T CURRENTLY sell the 4MB SIMMs you need to upgrade your LC to 10MB, though Apple-authorized service providers are able to obtain them from other sources and install them. Nonauthorized, reasonably competent computer stores and service shops can also install SIMMs properly. Compare prices, warranties (including fixing incidental damage incurred during SIMM installation), and turnaround times.

You can save $20 to $60 per SIMM if you buy them by mail order and install them yourself. The procedure is not difficult on modular Macs like an LC. Caution: Your Apple warranty or AppleCare service contract, if you have one, probably won't cover damage you cause while installing or replacing SIMMs. Here are some tips to avoid trouble. When removing old SIMMs, bend the retaining clips gently with a thin, nonconductive tool like a chopstick or an artist's brush, not your fingers. (If the clips break, they can be fixed: see the tip "Fixing Broken Supports" in this column.) To avoid damaging the SIMMs themselves with an undetectable static discharge from your body, don't wear wool or nylon, don't work in a carpeted area, and do ground yourself by wearing a grounded wrist strap or by touching the Mac's audio jack while the computer is plugged in.

Installing SIMMs in a compact Mac (Plus, SE, SE/30, Classic, or Classic II) requires special tools to unscrew the case and pry it apart. Many SIMM vendors sell these tools or include them with your purchase. CAUTION: Even if a compact Mac is off and unplugged, you can get a life-threatening electrical shock by touching some areas of the soldered side of the vertically mounted analog circuit board. Don't remove the paper backing from the analog board and don't work on a board with damaged paper backing. You can also get a dangerous shock from the thick wire that plugs in to the back of the picture tube if the wire is frayed or cracked. While removing the logic board to get at the SIMM sockets in a compact Mac, take care not to bump the end of the picture tube—it breaks!

SIMMs themselves are pretty much the same no matter where you buy them (see *Quick Tips*, January 1992, for details on SIMM incompatibilities). I called five mail-order vendors—LLB Company, Mactel Technology Corporation, Technology Works, Third Wave Computing, and Peripheral Outlet—to ask why their SIMMs were as good as or better than their competitors'. Like Apple, they all use surface-mount RAM chips on four-layer circuit boards. Mactel uses gold traces and contacts on its SIMMs, which it believes will enhance long-term reliability. Third Wave SIMMs are manufactured without the use of ozone-layer-depleting CFCs. The mail-order companies all have their SIMMs individually tested after assembly.

The main differences among SIMM brands lie not in product design or manufacturing but in price, payment terms, warranty, and support. These factors change, so I recommend you do your own research before buying. When comparing costs, look beyond basic price. Ask about availability, shipping charges, and delivery time. If you buy from an out-of-state company, you may escape paying sales tax and save $2 or more per SIMM. Make sure there's no surcharge for using a credit card and that your card will not be charged until the product is ready for shipment.

Most vendors now offer a lifetime warranty, and many let you return SIMMs within 30 days for a full refund. "Lifetime" means theirs as well as yours, but it's difficult to determine a company's long-term stability these days. Also, check turnaround time for warranty exchanges; it may be one day or several.



Buying more RAM for less, plotting HyperCard graphs, making hard drives System 7–compatible, and more

Clearly written installation instructions can greatly relieve the apprehension you may feel about opening your Mac to install SIMMs. Some companies include a video that shows you what to do. Technical support by telephone is also valuable, especially if it's toll-free.

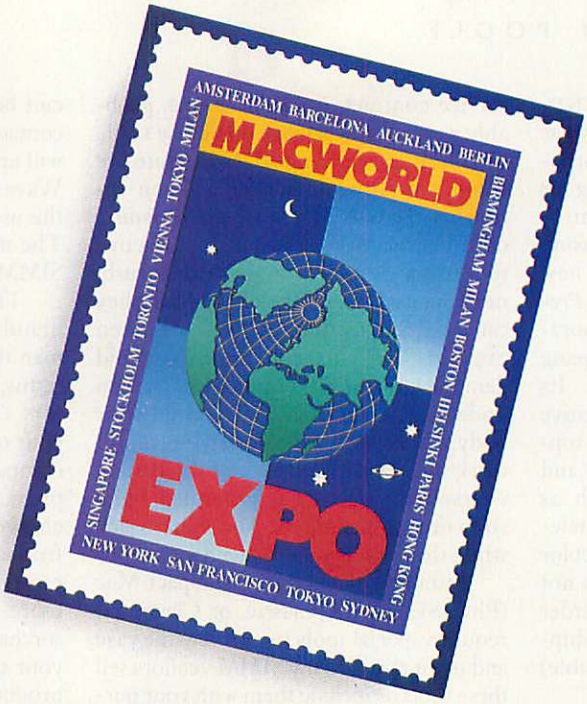
Hard Drive Upgrade

Q I HAVE A JASMINE DirectDrive 80 that I want to use for backup, but I understand that an upgrade of the disk operating system is necessary for compatibility with System 7. Jasmine doesn't respond to my inquiries. How can I obtain an upgrade?

Robert P. Kisko
Cherry Hill, New Jersey

continues

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MACWORLD EXPOSITION

EVERY HARD drive has driver software, which the Mac copies to its RAM while starting up and which acts as an intermediary between the system software and the hard drive. Some old versions of driver software do not work with System 7's virtual memory or 32-bit addressing options turned on. You install or update the driver software with hard drive utility software from the maker of your drive. Usually you can update without any loss of data. For various hard drive brands, the table "Driver Compatibility" lists the oldest version of driver software you can use with System 7's virtual memory and 32-bit addressing.

Jasmine has gone out of business, but you can get Jasmine DriveWare 2.0 for $29.95 from Seagull Software (415/361-0928). Seagull claims this version is fully compatible with System 7, including virtual memory and 32-bit addressing.

Several companies sell driver software that works with a wide variety of hard drives. I tried Drive7 from Casa Blanca Works (415/461-2227) and Hard Disk Toolkit from FWB (415/474-8055) on a Jasmine 80MB hard drive and on a SyQuest 45MB removable hard drive. The products delivered practically identical performance with a IIci. Hard Disk Toolkit has many options for tweaking the software and the hard drive that I didn't try (and you probably wouldn't either, even after reading the manual's detailed descriptions of hard drives and SCSI). For $120 less, Drive7 has the essential features you need.

DRIVER COMPATIBILITY

Vendor	Software Name	Oldest Version	Source
Apple Computer	Apple HD SC Setup	7.0	Included with System 7
APS	Alliance Power Tools	2.0	816/478-8300 800/235-2752
Casa Blanca Works	Drive7	1.7	415/461-2227
Club Mac	SCSI Director	1.7.2	714/768-1490 800/258-2622
CMS Enhancements	CMS SCSI Utilities	7.0	714/222-6000
Cutting Edge	HDD Formatter	3.4.1	307/789-0582
Ehman	HDD Formatter	3.4.1	800/257-1666
FWB	Hard Disk Toolkit	1.0	415/474-8055
GCC Technologies	DriveManager	7.0	617/890-0880
Hard Drives International	Disk Manager Mac	2.3	602/350-1128 800/776-3475
La Cie	SilverLining	5.3.1	503/691-0771 800/999-0143
Liberty Systems	Formatter One SCSI Director	3.2.9 1.9.7	408/983-1127
Mass Microsystems	PadLok	2.7	408/522-1200 800/522-7979
MicroNet Technology	MicroNet Utility Program	5.0	714/837-6033
Microtech International	MicroTech HD Formatter	3.0	203/468-6223 800/626-4276
Mirror Technologies	MediaManager	2.0.6	612/633-4450 800/654-5294
On Track	Disk Manager Mac	2.3	612/937-5161 800/872-2599
Optima Technology Corporation	DiskMount	2.4	714/476-0515
PLI	PLI Formatter	3.0	510/657-2211 800/288-8754
Rodime Systems	Rodime Driver Utility Cobra Driver Utility	2.1.0 1.1.0	407/391-7333
Seagull Software	Jasmine DriveWare	2.0	415/361-0928
Software Architects	Formatter One	3.2.9	206/487-0122
Storage Dimensions	MacinStor Installer	3.0.1	408/954-0710
SuperMac Technology	Manager	4.2	408/245-2202
Third Wave Computing	Disk Manager Mac	2.3	512/832-8282 800/284-0486

When upgrading to System 7, you may need to update the driver software on your hard drive to ensure compatibility with System 7's virtual memory and 32-bit-addressing options. This table lists the oldest version of driver software each company claims is compatible with these options.

Fixing Broken Supports

TIP: So you got new SIMMs for your Mac, and while removing the old ones you broke the poorly designed plastic retaining clips. Now your SIMMs dangle there and the Mac is useless. Don't despair. Go to a stained-glass supply store and buy a small bottle of Lumen-Essence's Sun set Glass Adhesive, for about $5. This adhesive, developed for the professional glass trade, is flexible and can take abuse. I have used it on computers and it really works.

Sun set cures only in direct sunlight, using the ultraviolet rays from the sun. It can be applied indoors and moved outside to set. With the computer case open, place a drop (use a toothpick as an applicator) on the two plastic SIMM supports where the back of the SIMM will contact them. Move the computer outside and hold the SIMM firmly against the supports for about two min-

continues



utes in direct sunlight—no finger shadows, please. The SIMM will be clamped in place. If you need to break the bonds in the future, use an X-acto knife.

Saul Krimsly
Potter Valley, California

M.Y.O.B. Packing Lists

TIP: We use Teleware's M.Y.O.B. to generate all the invoices and statements for our business. Because packing lists and invoices contain very similar information, I figured there must be a way to print packing lists with M.Y.O.B. But a Teleware service technician curtly informed me that it was not possible and that others had called with the same request. Not ready to give up so easily, I sat down with M.Y.O.B.'s Form Customization tools and quickly solved the problem. Here's what you do.

After printing invoices in the usual manner, save. Next choose Print Invoices from the Sales & Receivables menu and click the Customize button. Then create a field for the words *Packing List* and set the font, size, and style you want. Drag the Invoice field off the page and replace it with the new Packing List field. In addition, select all the fields that contain price information and drag them off the page. Now you can click Preview or OK. Ignore the warning that says your old invoice form will be replaced if you continue. Your old invoice form will not be replaced if you do not save. Print packing lists for your orders as you would print invoices. When you finish, choose Quit from the File menu. *Do not save.* Your M.Y.O.B. file is left unchanged since the last time you saved, and you have a fistful of packing slips for order packing and shipping.

To make this procedure even easier, you can put the Packing List field on your standard invoice form, but dragged off the page where it does not print. When you're ready to print packing lists, you just drag that field back on the page and proceed as described above.

L. Lee Cerny
Swanton, Ohio

Instead of dragging the invoice fields off the page, you could double-click each and set the Inactive option. Then choose Hide Inactive from the Form menu (see "House-Made Packing List"). When you print the packing lists, be sure you turn off the Unprinted Invoices Only option or the invoices you just printed won't print as packing lists.—L.P.

HyperCard Graphing

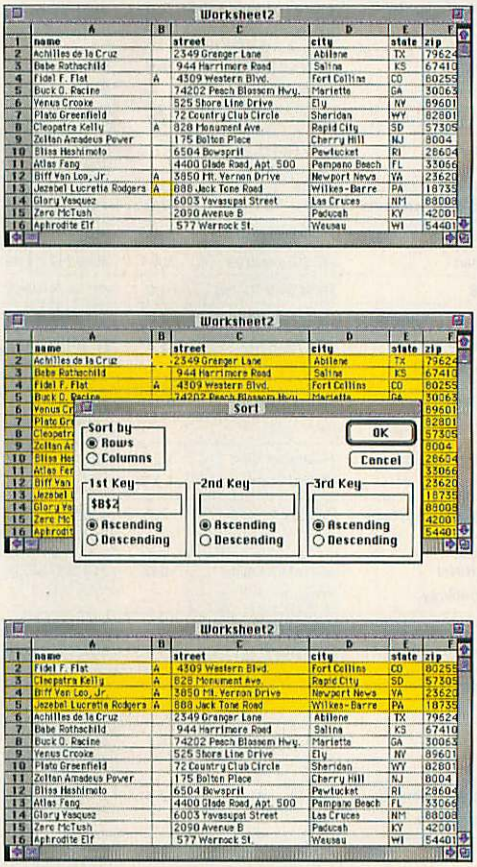
TIP: I found a neat way to draw a graph in a HyperCard stack using radio buttons as data points and connecting them using the line tool. The following handler, **createPoint**, places a radio button at the *x*-*y* coordinates you supply when you use the handler:

```
on createPoint x,y
  set LockScreen to true
  doMenu New Button
  set loc of last btn to x,y
  set style of last btn to ¬
    "radioButton"
  set hilite of last btn to true
  put item 1 of loc of last ¬
    btn into a
  put item 2 of loc of last ¬
    btn into b
  set rect of last btn to ¬
    a - 10, b - 6, a + 10, ¬
      b + 6
  choose browse tool
end createPoint
```

The **createPoint** alters the button's rectangle (**rect**) to center the button's circle at the *x*, *y* coordinate. If you wish to have the actual points invisible and just show the lines connecting them, then replace the lines between **set loc of last btn to x,y** and **choose browse tool** with **hide last btn.** The coordinates you supply must be scaled to fit in the space in which you want the graph plotted on the card.

After plotting all data points by re-

Deleting Nonadjacent Rows

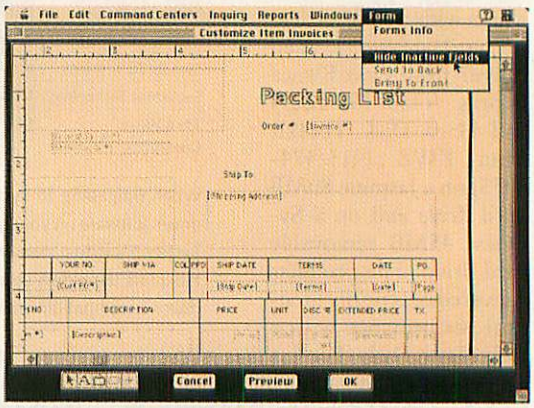


Excel's Delete command (Edit menu) doesn't work on a selection of nonadjacent rows in a spreadsheet or database, but Tim Semple of Lincoln, Nebraska, has come up with a workaround.

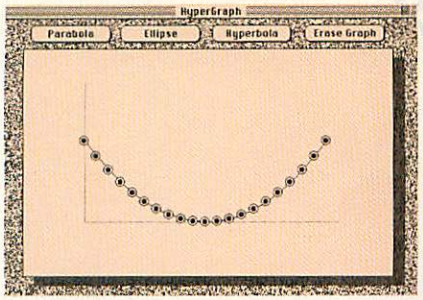
Instead of deleting one row at a time, insert a column in which to mark the rows you want to delete; insert it next to any convenient column in the spreadsheet or database. In that column, type an *A* in each row you want to delete. Don't type anything in that column for the rows you want to keep.

Then select all the rows of the spreadsheet or database, excluding titles and totals, if any, and use the Sort command (Data menu) to sort the rows by the new column. After choosing Sort from the Data menu, you must change the sort key or Excel will sort by column A. To change the sort key, simply click in the topmost cell selected in the column you just created (B2 here).

All the rows you marked move to the top of the selection, where you can easily select and delete them as a contiguous range.



House-Made Packing List Although M.Y.O.B doesn't print packing lists, you can reprint invoices on packing list forms. For example, as shown here, you could change the usual custom invoice by inactivating the fields you don't want printed on the packing lists and adding the words *Packing List*.



HyperGraph A simple HyperCard script (see the tip "HyperCard Graphing") draws a graph like this by creating a radio button for each point and drawing lines between them with the line tool.

peatedly using the **createPoint** handler, you can use the following handler to connect them in the order in which they were plotted:

```
on drawGraph
 repeat with n = 1 to number of ¬
   cd btns - 1
 choose line tool
 drag from loc of cd btn n to loc ¬
   of cd btn (n + 1)
 end repeat
 choose browse tool
end drawGraph
```

R. McGillis
Del Mar, California

Your method doesn't work if there are already buttons on the card. The following background button script uses the **createPoint** and **drawGraph** handlers (which could be in the card, background, or stack script) to graph a parabola in the middle of a card (see "HyperGraph").

```
on mouseUp
  repeat with x = 0 to 20
  set cursor to busy
  createPoint x * 15 + 100, f(x) + 150
  end repeat
  drawGraph
end mouseUp

  --calculate a y value given an x value
  function f x
  return 20 * x - x * x
end f>>
```

—L.P.

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LON POOLE answers readers' questions and selects their tips for this monthly column. His two most recent books are *Amazing Mac Facts* (Microsoft Press, 1991), a collection of the best published tips; and *Macworld Guide to System 7* (IDG Books Worldwide, 1991).



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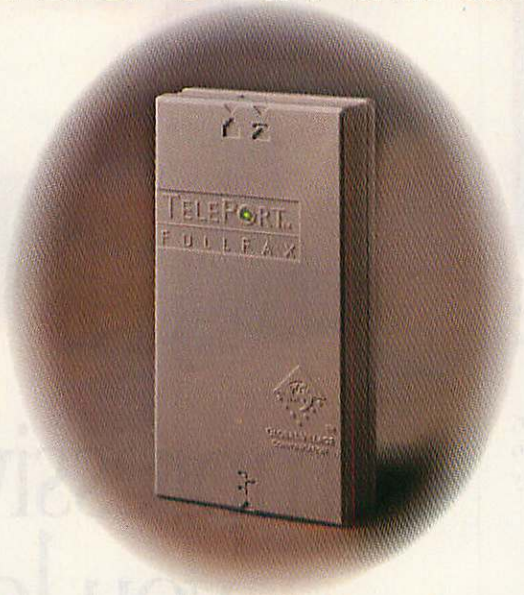
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Personal Finance Software

BY JIM HEID

A NEW YEAR HAS BEGUN AND tax season is right around the corner. The holiday bills are hung by the chimney with care, in hope that some stray sparks soon will be there. At times like these, a haunting voice is heard in the halls of Getting Started Central: Get a handle on your finances. Work out a budget that works. Start planning for April 15. Start planning for age 65. Start planning.

This year, it's going to happen. My wife and I have resolved to tame the wild beast that is our bookkeeping system, and we're going to use the Mac and personal finance software to do it. Personal finance software lets you write checks, reconcile checking accounts, track expenses, calculate your net worth, and more. At tax time, you can print reports detailing income and expenses. You can also transfer data to a tax-preparation program such as ChipSoft's (formerly SoftView's) MacInTax. It's easy—according to the software boxes.

The truth is, using the Mac to manage your finances requires an investment in time and a commitment to electronic bookkeeping. You need to break old habits (shoeboxes full of receipts, unbalanced checkbooks, unrecorded automatic-teller-machine [ATM] transactions) and develop new ones (regular data entry sessions, careful record-keeping, organization).

Because finance programs require year-to-date information to produce the most complete reports, this is a good time of year to start using the Mac to manage your money. This month I examine the assets and liabilities of personal finance software.

A Database for Dollars

A PERSONAL FINANCE PROGRAM IS really a database manager, which lets you enter data, search for specific entries, sort information according to categories, and print reports that summarize it all. But data managers such as Claris's FileMaker Pro are generalists, able to manage anything from names and addresses to bird sightings. A personal finance program's searching, sorting, and report-printing features are designed for dollars.

At the core of most personal finance programs are features for tracking your income and expenses. You set up the program with income and expense categories that show where your money comes from and where it goes (see "Income and Outcome"). You can then use the program's check-printing features to write checks, whose amounts the program automatically subtracts from your balance. When your monthly bank statement arrives, you can use the program to reconcile the statement, checking off the transactions that have cleared the bank (see "The Check's in the Mac").

Check-writing features are especially useful for *recurring charges*—those bills that rear their ugly heads on a regular basis. You can set up a program to write checks for these bills automatically, or to display a reminder when a given bill is due. Aatrix Software's CheckWriter II and Intuit's Quicken even include software that displays reminders when you start up the Mac. CheckWriter II also includes a desk accessory that enables you to cut a check without having to start up the CheckWriter II application.

As for the checks themselves, all personal finance programs include catalogs for ordering checks in several sizes and formats. If you have a dot matrix printer such as Apple's ImageWriter II, you'll probably want continuous-feed checks that you separate after printing. If you want a copy of each check you print, order *two-part* checks. For laser printing, you can order checks printed on individual sheets that you can feed manually or load into a paper tray. *Window envelopes* are also available; combine them with a program's ability to print the payee's address on a check, and you don't have to hand-address envelopes. CheckWriter II can also print on your existing checks; you create a layout that positions each item where it belongs and then feed the checks into your printer.



How to use the Mac to manage your money

Unless you tote a Mac PowerBook and a printer with you to the grocery store, you'll still need to handwrite checks now and then. Of course, you'll need to enter handwritten checks, ATM transactions, and the like. It's drudgery, but it's essential for keeping complete, accurate electronic books.

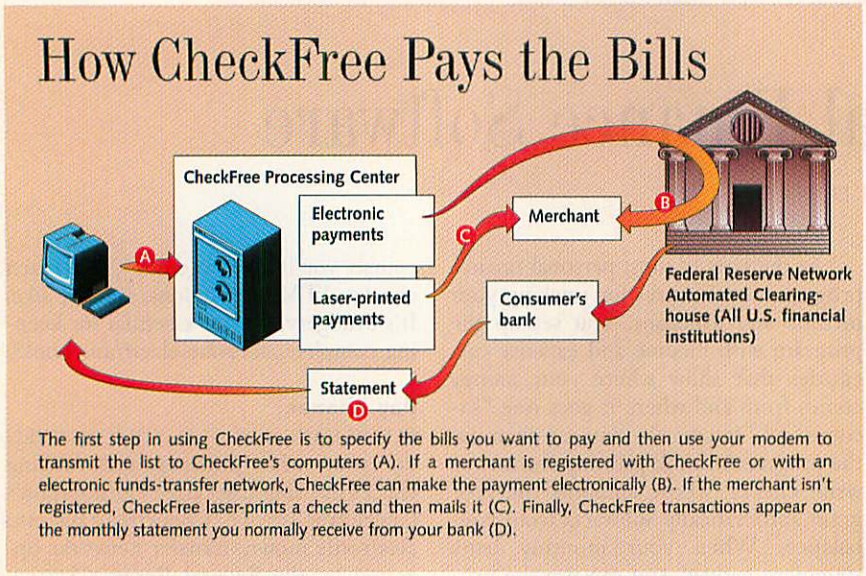
Pay Phones

IF YOU HAVE A MODEM, YOU CAN EVEN do away with printing and mailing checks by using Checkfree Corporation's CheckFree service. Checkfree taps into electronic money-transfer networks operated by the Federal Reserve System and major credit card companies. You use the CheckFree software to specify payments, and then dial up the Checkfree processing center, which transfers the funds from your account to the payees' (see "How CheckFree Pays the Bills"). You can specify that Checkfree automatically pay recurring charges on a given day of each month. Checkfree will also mail laser-printed checks to small merchants that aren't set up to receive payments electronically.

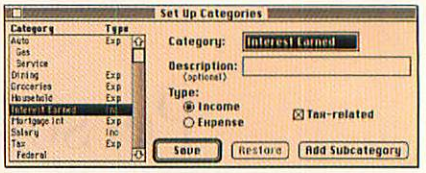
Its name notwithstanding, CheckFree isn't free. You can make up to 20 payments per month for a $9.95 monthly fee (additional payments are $3.50 per ten or portion thereof). The software itself costs $29.95, although you can avoid buying it if you use Quicken or Andrew Tobias' Managing Your Money, from MECA Software. Both support the CheckFree service directly.

Is CheckFree worth it? You decide. It costs $5.80 to mail 20 bills, not including the cost of the checks themselves. Ultimately, what you save most is time. If you're adept at the software, paying with CheckFree is faster than writing (or printing) checks, stuffing envelopes, and licking stamps. There are potential problems, however: *Macworld* has received two complaints from readers who claim Checkfree didn't pay some bills on time or sent payments to the wrong accounts. What's more, if such a mishap occurs, you may have trouble proving you actually paid a bill, since Checkfree doesn't provide written receipts for bills it pays electronically.

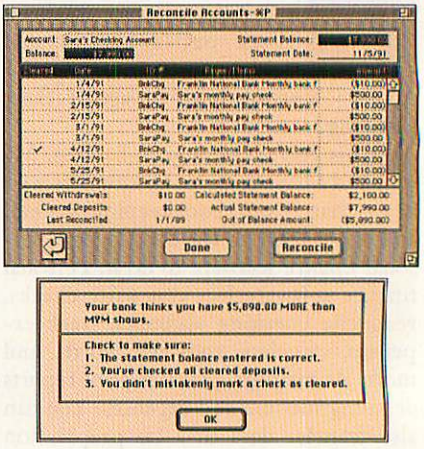
continues



The first step in using CheckFree is to specify the bills you want to pay and then use your modem to transmit the list to CheckFree's computers (A). If a merchant is registered with CheckFree or with an electronic funds-transfer network, CheckFree can make the payment electronically (B). If the merchant isn't registered, CheckFree laser-prints a check and then mails it (C). Finally, CheckFree transactions appear on the monthly statement you normally receive from your bank (D).



Income and Outcome An important first step in setting up a personal finance program is defining the categories that describe your sources of income and your expenses. Here, an income category called Interest Earned is being created in Intuit's Quicken. Most programs allow you to create subcategories within each category. You might create Interest Earned subcategories for keeping track of checking account and savings account interest, for example. Here, subcategories were created for the Auto expense category.



The Check's in the Mac Like most personal finance programs, Managing Your Money can help you reconcile a bank statement. At top, checks that have cleared the bank are indicated with a check mark. When you click the Reconcile button, Managing Your Money compares the starting balance with the total of deposits and withdrawals. If the balances don't match, a dialog box appears notifying you of the problem (bottom).

From Checks to Balances

ALTHOUGH IT DOESN'T ALWAYS SEEM so, there is more to personal finance than writing checks. If you're interested in computerizing other aspects of your financial life, you'll want to look beyond Aatrix's CheckWriter II or CheckFree to programs such as Quicken, Managing Your Money, Survivor Software's MacMoney, Software Toolworks' Dollars & Sense, and DacEasy's Light Checkbook Accounting.

An important step in planning for the future is knowing where you stand today. One way to do that is to calculate your net worth by supplying a program with a list of all your assets (bank account balances, house, car, jewelry, investments) and your liabilities (mortgage or rent and other debts). The program totals the assets and liabilities and produces a report called a *balance sheet*. Managing Your Money can also display balance sheet information as a sometimes humbling pie chart that shows how each asset or liability contributes to the big picture (see "What Am I Worth?").

Developing and adhering to a budget involves describing your sources of income and projecting your expenses with as much detail as possible. As you use the finance program to write checks and record income and expenditures, you can compare your actual figures against your projections and adjust your expenses to make sure that you aren't spending more than you're making. Most programs can display bar graphs that compare actual results to projections.

With mortgage interest rates at their lowest point in years (at least as of this writing), many people are contemplating buying a house. Managing Your Money and MacMoney can calculate loan *amortization schedules*—tables that show what your monthly payments will be at a given interest rate and how much of each payment is applied to the principal and interest. Managing Your Money's loan-analysis features are especially powerful—you can, for example, customize the payment schedule to accommodate an adjustable-rate mortgage. Managing Your Money can even help you determine whether you will save money by refinancing an existing mortgage, considering points, closing costs and other expenses, and how long you plan to keep the house after refinancing.

CheckWriter II version 4.0, in development at this writing and due to ship by the time you read this, also has loan-analysis features. Besides offering more-complete budgeting and checkbook-management features, the new version also has some fun features. The Pyramid Scheme Debunker window proves the only person who makes money in a pyramid scheme is the person who starts it. The Lotteries and Sweepstakes window points out the grim reality behind playing lotteries: your odds stink, and even if you beat them, your winnings will be doled out in small yearly chunks. After reading the on-screen tutorial on lottery payment schemes, I finally understand why the people who win often decide to keep their jobs.

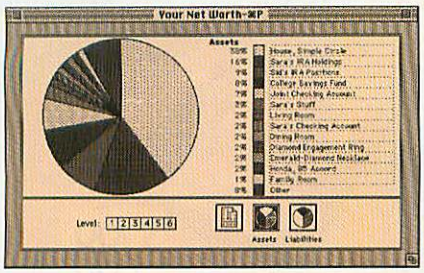
Planning Ahead

HERE AT GETTING STARTED CENTRAL, we don't exactly have a squirrel's sense of savings. Our investments comprise a money-market account, a few baseball cards, and some coins under the couch cushions. But we can dream, thanks to the investment-planning and -analysis features many finance programs provide.

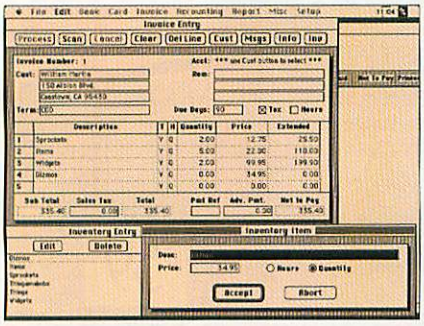
MacMoney and the forthcoming CheckWriter II 4.0 offer simple retirement-planning features: specify the amount of yearly income you'd like, the number of years until you'll retire, as well as take-a-guess variables such as the best available interest rate and the rate of inflation. The programs then calculate how much you need to sock away each year. Sit down before reading the results.

Managing Your Money can also help you plan for your retirement. In addition, it can calculate how much life insurance you should have in order to supply your heirs with a certain income for a certain amount of time. It can even calculate your life expectancy based on variables such as whether you smoke, wear seat belts, and exercise.

Managing Your Money's financial-planning features are more complete than the competition's. The program lets you track the performance of a variety of investments, including stocks, bonds, and



What Am I Worth? Most programs can calculate your net worth by subtracting your liabilities (what you owe) from your assets (what you own). Managing Your Money can also display the results as a pie chart that graphically compares your assets and liabilities. You can double-click on any item to display or change its description and value.



Light Accounting DacEasy's Light Checkbook Accounting can track, calculate, and print invoices. You use the Inventory Item window (bottom right) to enter a list of products or services you sell. You can add items to an invoice by double-clicking on them in the Inventory Entry window. The program then calculates the invoice total.

mutual funds. You can maintain a running tally of your gains and losses and compare your portfolio's performance against the Dow Jones industrial average.

Other planning features in Managing Your Money help you decide whether and how much to contribute to an individual retirement account (IRA) or Keogh—401(K)—plan; and help you determine how much to save for the cost of a child's college education, based on factors such as the child's current age, the number of years he or she will be in college, your current savings and the rate of return on it, and the estimated rate of college tuition inflation.

Planning for April 15

WHEN TAX TIME ARRIVES, PERSONAL finance programs can help in several ways. If you've faithfully recorded your income and expenses, you can print reports summarizing or detailing both, saving you or your accountant a lot of calculating time. Most programs can group expenses into categories that have counterparts on tax forms, such as transportation, lodging, and medical expenses.

Managing Your Money is the only general-purpose finance program that can also estimate how much tax you owe. The program is updated each fall to reflect the latest tax laws. Managing Your Money does not produce the actual tax forms, however; if you want to computerize your tax return, you'll need tax-preparation software such as ChipSoft's MacInTax. Most finance programs create files that you can import into a tax package. I examined tax software in the March 1989 *Getting Started.* Although new programs have appeared since then, the basic concepts—and cautions—behind doing your taxes on the Mac still apply (see "Taxing Your Mac" in this article and "Money Management Cures," *Macworld*, March 1991).

Picking a Program

WHICH PERSONAL FINANCE PROGRAM is right for you? It depends on the complexity of your finances as well as the extent to which you want to computerize them. For basic checkbook management, CheckWriter II is a good choice; the forthcoming version 4.0 compares favorably to more complex programs. For checkbook management and basic financial planning—budgeting, calculating net worth, and so on—consider Quicken, MacMoney, or Dollars & Sense. Quicken is the most polished program of the three, with a superior manual and the most features. Dollars & Sense is hampered by a manual printed in 7-point type. Managing Your Money is the most complete program of the bunch, and its manual—coauthored by financial guru Andrew Tobias—is superb. But the program's depth requires an investment in learning time and a commitment to electronic bookkeeping; if you aren't the bean-counting type, you might want to consider a simpler program.

For keeping track of a small business's books, consider Quicken or DacEasy's Light Checkbook Accounting. The former can print payroll checks, and the latter can print invoices and mailing labels (see "Light Accounting").

Fortunately, one factor that should not influence your decision is which Mac you own. Unlike many of today's programs, personal finance software runs well on Classics and Quadras alike. Many packages even run on a machine without a hard drive.

If you're on a tight budget, check out the finance software available from Heizer Software (510/943-7667, 800/888-7667 [orders only]). Some of Heizer's packages are templates that you use with Microsoft Excel or Works; others are stacks that run under HyperCard. The firm offers software for writing checks, logging expenses, budgeting, tracking utility bills, preparing taxes, and much more; most cost less than $20. It's a good way to test the waters of computer-based financial management.

Whichever program you choose, be sure to back up your data often. Also consider keeping a backup in a separate location to protect against losing your data to fire, water damage, or theft. And be sure to enter those ATM withdrawals and handwritten checks promptly.

Is electronic financial management for you? If you're organized to begin with—if you're the rare person whose checkbook is always balanced and whose receipts are always filed—you'll adjust quickly to managing your finances on the Mac. If you're like most people, you'll find the initial process time-consuming and, occasionally, confusing and frustrating. Persevere. The main benefit of a personal finance program isn't its error-free math, its planning and analysis features, or its flashy reports. It's that it forces you to do what you ought to have been doing all along. **m**

See *Where to Buy* for contact information.

Taxing Your Mac

Tax programs such as MacInTax use on-screen versions of those same IRS forms we see in our worst nightmares. You type the key figures in the appropriate places, and the program calculates the good or bad news. The forms are electronically linked so that changes in one are reflected throughout your return. Most programs can also print IRS-approved forms.

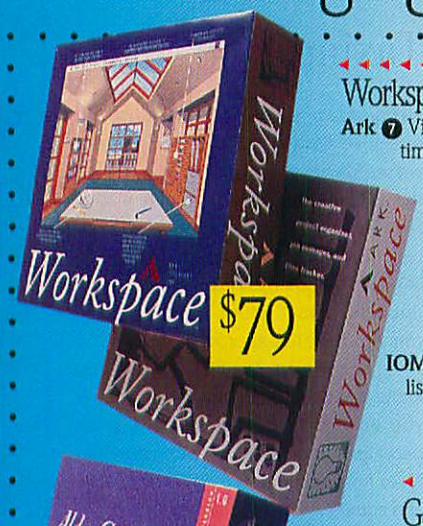
Tax software can be a boon if you know what you are doing, and a bane if you do not. Think twice about a tax package if you do not prepare your own taxes now or if your last return was large and complex. Learn about the aspects of tax law that affect you. Anticipate your results; you should have a rough idea of what your return will look like before you start. Also make sure that the program you are considering includes support and forms for your state return.

Most important, know your limits. If you get stuck, consult a professional.

Contributing editor JIM HEID looks at a different aspect of Mac fundamentals each month. His latest book, *Macworld Complete Mac Handbook* (IDG Books Worldwide, 1991), is an updated and expanded collection of more than 40 *Getting Started* columns.

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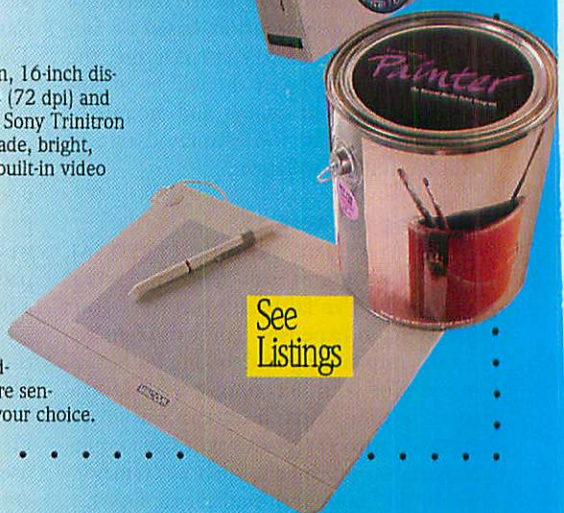
Symantec 7 O Repairs more disk problems than any other automatic utility product. Intuitive graphical interface provides ease of use regardless of experience level. 1991 winner of both the MacUser Editors Choice award and the MacWorld World Class Award.



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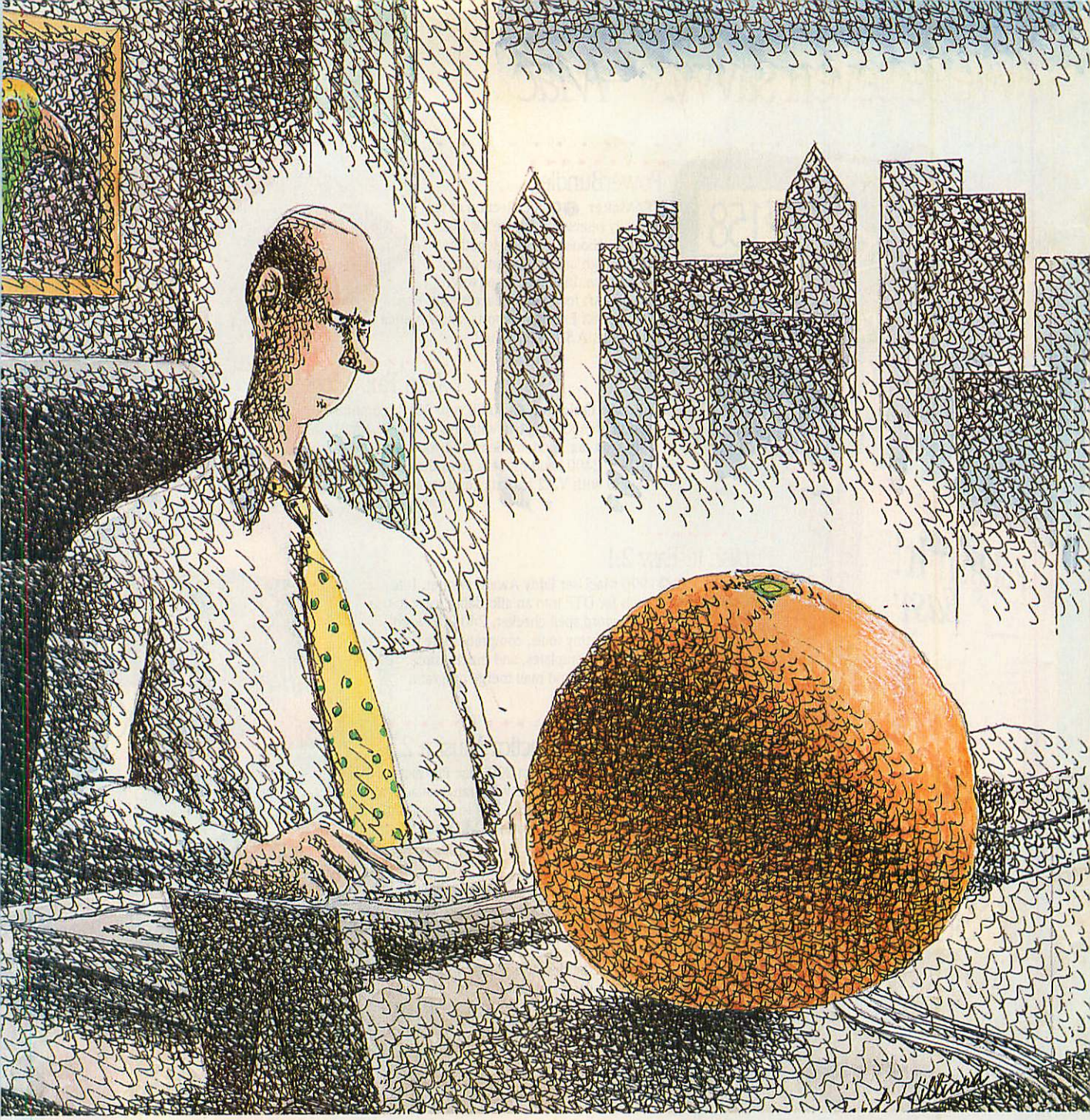
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*When you call, you know that the person you're speaking with is sitting in front of a Mac not a PC or a dumb terminal like other companies we know. We understand Macintosh products because we use them every day. And since our salespeople aren't on commission, we'll guide you to exactly the right products, without wasting your time and money. That's what customer service is all about. Right?

"We're seven savvy." –Mac



$158

PowerBundle

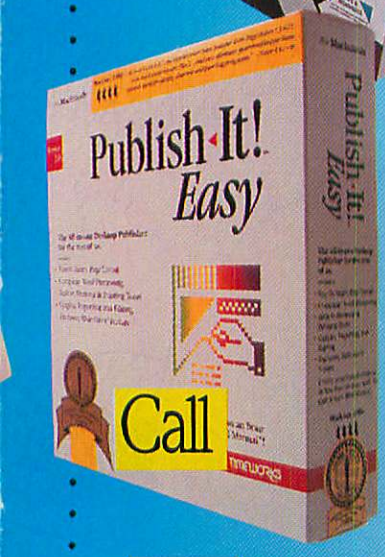
T/Maker 7 O A collection of specially selected software for Mac PowerBooks bundled together in a high quality custom carrying case. Includes WriteNow, ClickArt for Faxes, AddressBook Plus, Business Expense Reports, and America Online. A $588.80 value!



$198

Xeba Fax/Modem

Logicode Quicktel 7 Fulfill your Mac's communication potential in style with this hot, new, quality built fax/modem. Send and receive faxes at 9600 bps. 2400 baud modem gives throughput up to 9600 with V.42 bis data compression. Totally state-of-the-art!



Publish It! Easy 2.1

Timeworks 7 O 1990 MacUser Eddy Award winner. Integrates all the basic tools for DTP into an affordable, easy-to-use program. Incls:112,000-word spell checker, 240,000-word thesaurus, drawing and painting tools, comprehensive page layout tools, and 72 sample templates, and much, more. Now with FILE-IT!, a database and mail merge program.



$66

Practica Musica 2.3

Ars Nova 7 O One of Mac User's "Best 200 Mac Products of 1989." Includes sampled sound, textbook, and a wide range of activities (scales, intervals, chords, melody and rhythm). Fun to use and fully MIDI compatible (MIDI not required).



$38

Spectre

Velocity 7 The most addictive game since Tetris--only better. Experience virtual reality as you drop into a cyberpunk battleworld. Power around the CyberArena in a customizable BattleCraft, a fully armed and armored futuristic tank-like vehicle. Action levels compare to the best at any arcade.



$215

MicroPhone II V. 4.0

Software Ventures 7 O The latest, most widely used communication software in the Mac enviroment. Supports System 7 features and the Connection Manager of the Communications Toolbox. Also supports HyperCard 2.0 XCMDs and XFCNs. Speedier than ever, too.

ORDER INFO

Mac's Policies

- Visa, Mastercard, American Express, and OPTIMA gladly accepted.
- Your credit card is never charged until your products ship.
- When a partial order is shipped, no additional freight is charged for shipments that complete the order (U.S. only).
- Most items carry the manufacturer's 30 or 60 day Money Back Guarantee (MBG). Mac's Place has a 30 day MBG on most hardware (USA only). We maintain the right to limit quantities on MBG returns. Ask for details when ordering.
- 120 day limited warranty on all products, some hardware items carry one and two year warranties. Defective software is replaced immediately with like item(s). Defective hardware items repaired or replaced at our discretion. Loan drives subject to availability (USA only).
- Most personal and company checks approved upon receipt to insure immediate shipment. For non-standard checks and checks over $1,000, allow ten working days for clearance.
- No sales tax (except WA residents add 8.2% to total, including shipping).
- All returns must have an authorization number. Please call 800-367-4222.
- All prices & promotions subject to change without notice. All items subject to availability. Not responsible for typographic errors.

Orders USA: Orders placed weekdays by 7:30 pm E.S.T., 4:30 pm P.S.T. for "in stock" items ship same day (barring system failure, etc.) for overnight delivery via Airborne Express. Our $3.00 shipping charge includes insurance at no extra charge. Rural locations may require an additional day for delivery. Areas not serviced by Airborne (Airborne does not deliver to P.O. Boxes) will be sent via U.S. Postal Service or UPS Second Day. Alaska & Hawaii orders ship UPS 2nd day air. Alaska customers outside metropolitan areas pay full shipping charges, ask for rates.

Please have the following information ready:

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***Purchase Orders:** Government, School, and Institutional P.O.'s clear immediately. Corporate PO's subject to credit approval. Full shipping charges apply, prepaid and added.

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Electronic Mail Orders: Compuserve (76635,660); GEnie (PLACE); America Online (MacsPlace). Mac's Place uses CE Software's QuickMail™ to check our mail each hour.

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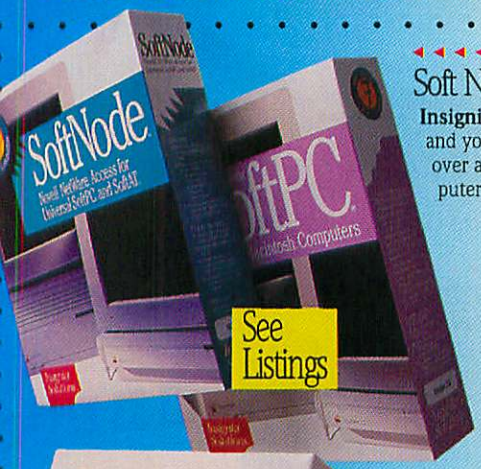
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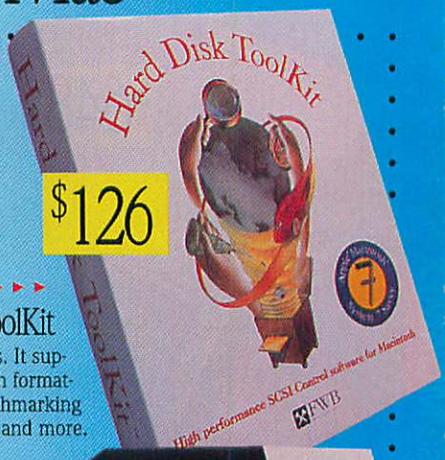
"Ask a Mac Wizard about System 7." –Mac



See Listings

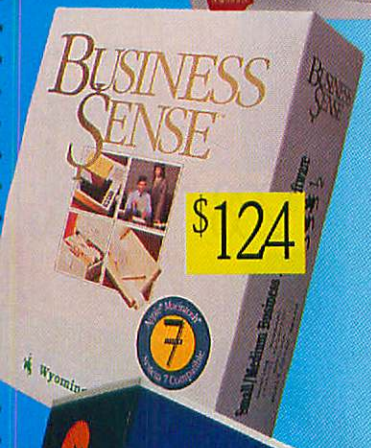
Soft Node 1.0/Universal SoftPC 2.5

Insignia 7 Add SoftNode to either Universal SoftPC or SoftAT and your Mac will run MS-DOS applications and share programs over a Novell PC Network! With SoftPC, your next IBM computer could be a Macintosh.



Hard Disk ToolKit

FWB 7 This savvy utility is a must for all power users. It supports all SCSI hard drives, removables and opticales with formatting, partitioning, password protection, encryption, benchmarking and more.



Business Sense 1.5

Wyoming Software 7 Easy to use, fully Integrated Accounting System with AR, AP, Payroll, GL and Automatic Recurring Entries. Complete importing and exporting capabilities. Cash Management Reports including printing of W-2's and 1099's . 4 ½ mouse rating.



TouchBASE

After Hours Software 7 A database designed to help you keep track of personal and business contacts. Use it yourself or take advantage of its multi-user capabilities. Once TouchBASE has organized your contacts, you can use it to print envelopes, labels, address books, fax cover sheets, reports, and more.



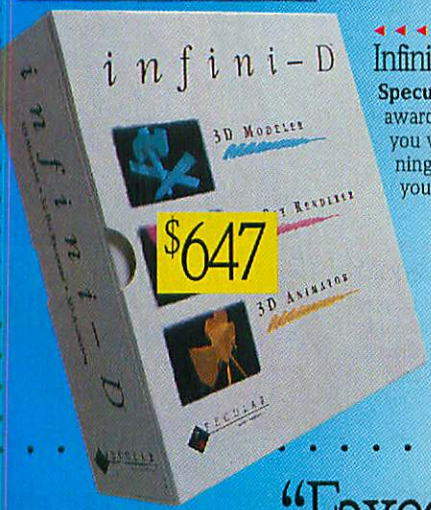
QuickMail 2.5 10 Users

CE Software 7 With over 350,000 users worldwide, QuickMail is the leading E-mail system for AppleTalk networks. Now offers the same power and ease of use to DOS, Windows, and OS/2 users in file server environments.



EZ Music Starter Kit

Opcode 7 Includes: EZ Vision--Multi track sequencer, tons of features; MIDI Translator-- MIDI interface (1 in, 3 out); Book of MIDI--HyperCard stack for learning MIDI; and PAN Membership--Musicians' BBS full of tips and support. Requires Mac Plus and MIDI sequencer.



Infini-D

Specular 7 Nominated for two MacUser Eddy awards (Best Animation, Best Renderer), Infini-D will let you visualize, communicate and sell your ideas with stunning 3D graphics and animations, at a cost that will keep you ahead of the competition.



WordScan Plus/WordScan

Calera 7 Scan any printed document right into your word processor, spreadsheet, or database with the most powerful OCR available. WordScan-$248 offers incredible accuracy and speed at an affordable price. Plus-$734 adds advanced productivity features you can't find anywhere else.

"Faxed P.O.'s welcome" –Mac

"You can't sell Mac stuff unless

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Access CD Allegro

Optical Access Intl. 7 O The fastest CD-ROM drive available with a 310 ms. access time. Includes SuperCache® software for lightning speed access to large amounts of information. Features headphone jack, stereo RCA type audio connectors, and deluxe desk accessory. Includes cable, sample CD, and one caddy.



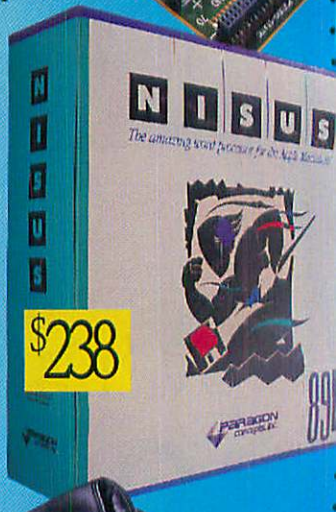
PowerBook RAM

Mac's Place 7 O PowerBook RAM- Now available! RAM for your Powerbook 100, 140 or 170. Expand to 4, 6 or 8 megabytes. Available from Mac's Place. 2-Meg:$298 • 4-Meg:$498. • 6-Meg:$598.



Sherlock Holmes Consulting Detective CD

ICOM 7 Match your wits with the super-sleuth! Over 90 Minutes of full-motion video let you take Sherlock and Watson through the streets of London to interrogate suspects and solve three murder mysteries. Unbelievable fun!



Nisus 3.06

Paragon Concepts 7 With features like unlimited undos, noncontiguous selection, an integrated thesaurus, foreign language dictionaries and PowerSearch, Nisus 3.06 simplifies even big writing jobs. Plus graphics with page layout capabilities. And for PowerBook users, the new streamlined Nisus Compact.



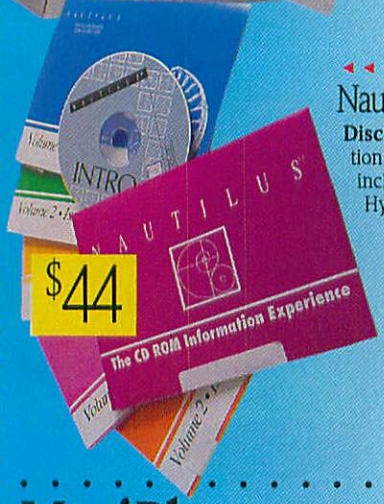
Showplace/MacRenderMan CD-ROM

Pixar 7 This CD-ROM is packed with plenty of programming. First, there's Showplace and MacRenderMan. Plus online documentation for both products, a gallery of images created with Pixar products, a sample of Pixar animations, and information about Pixar and its products.



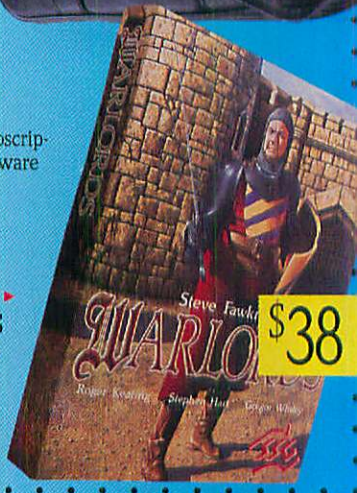
Compu-Case ™ for the Power Book

InCom O Durable, rugged and long lasting. Designed with all the pockets you need, plus a velcro insert that allows for separating your PowerBook and power pack or to hold other hardware, cords and cables.



Nautilus Backpac

Discovery 7 O Sample top-selling Mac CD ROM products! Backpac trial subscription includes six CD ROM issues of NAUTILUS with over 2 gigabytes of software including games, sound effects, music tracks, MIDI, digitized photos, Hypercard® stacks, multimedia presentations and more.



Warlords

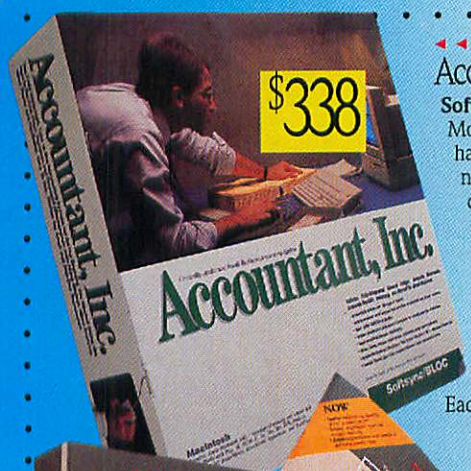
SSG 7 A fight to the finish where only one of eight empires can prevail! Starting from your home castle you must ruthlessly expand your territory and elimanate all other players. Works on all one meg Macs or greater including the Quadra and PowerBooks.

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"System seven software

you know Macs." –Mac



Accountant Inc.

SoftSync 7O More features. More Power. More Flexibility. No wonder Accountant, Inc. has received the prestigious Eddy Award nomination two years in a row! New features include System 7 support, Report Writer and a MultiUser Version.



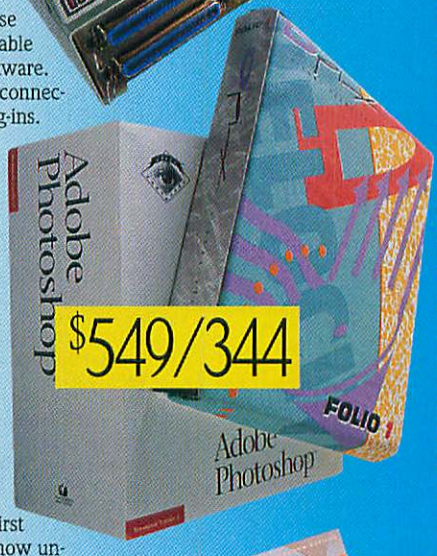
DataPlace Hard Drives

DataPlace 7O Available only at Mac's Place, these quality Quantum hard drives and Syquest Removable Cartridge drives come with DataWare formating software. Each features a selectable SCSI ID switch, two 50 pin SCSI connectors, an external fuse and two AC Plug-ins.



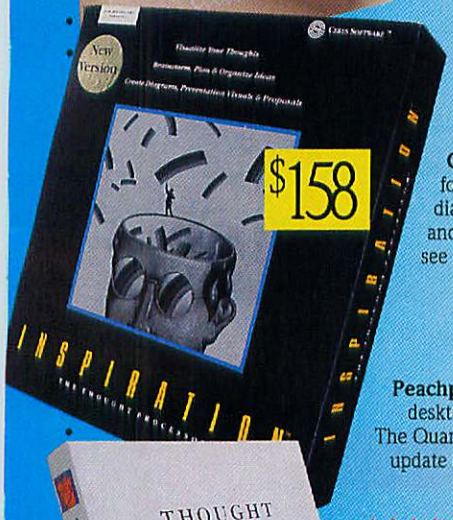
Timeslips Accounting Link for the Mac (TAL)

Timeslips 7O Extend the power of new Timeslips III 2.1 with or without general ledger accounting software. Provides customized income reports and links billing and payment data from Timeslips III 2.1 to many general ledger or accounting programs such as Accountant, Inc..



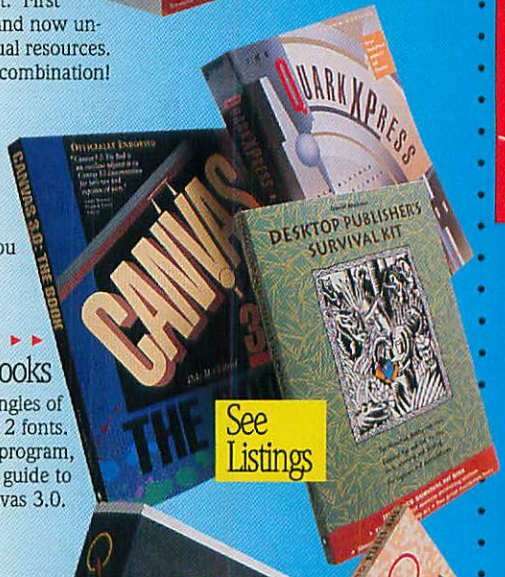
PhotoShop/Folio 1

Adobe/D'Pixx 7 Folio 1 features 100 24 bit color photographic images for multmedia and magazine-quality print. First PhotoShop with unmatched image editing capabilities and now unlimited rights. Incredible variety and endless visual resources. What a combination!



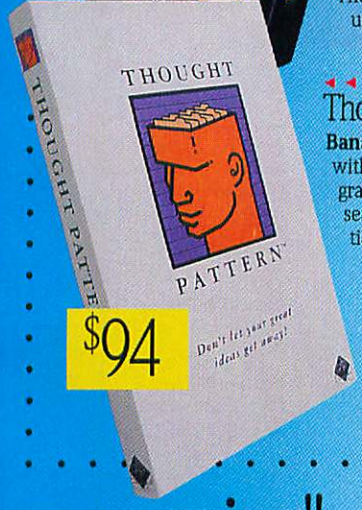
Inspiration

Ceres Software 7O Innovative visual thought processor for brainstorming, organizing, and communicating ideas as diagrams, mindmaps, presentation visuals, outlines, reports, and proposals. Integrates diagramming and outlining to help you see and communicate your ideas as visuals and text.



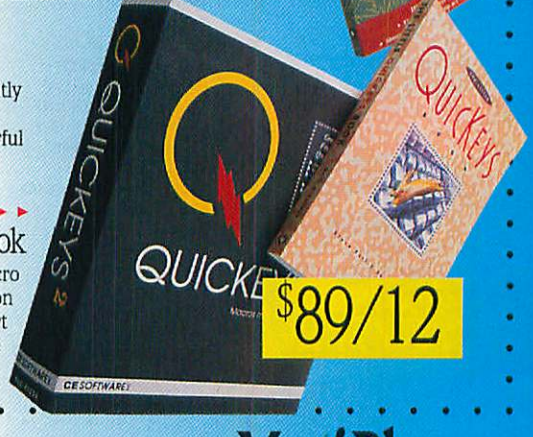
Desktop Publishing Books

Peachpit Press DTP Survival Kit (w/disk)–Guides through the jungles of desktop publishing. Disk includes 12 top DTP utilities, clip art & 2 fonts. The QuarkXpress Book–leading book on this hot desktop publishing program, update for v. 3.1 & Xtentions. Canvas 3.0 – the ultimate fact filled guide to Canvas 3.0.



ThoughtPattern

Bananafish Software 7O Get organized and work more efficiently with ThoughtPattern, the information manager that lets you integrate notes and files. Features automatic cross-referencing, powerful searches, alarms, priorities and direct launching of other applications.



QuicKeys² 2.1 & Little QuicKeys Book

CE Software 7O System 7 savvy vers. of the leading macro product for the Mac. Fully 32-bit clean and offers Balloon Help. QuicKeys 2 can "drive" applications that support Apple® Events through its Apple Events Extensions. Little QuicKeys Book from Peachpit is the perfect reference guide for only $12.

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HOW TO ADOBE PHOTOSHOP 2.0

Insights

BY DEKE McCLELLAND

Tips for the Consummate Photo Editor

Some wonder at its capabilities, some worry about its implications, but whether you view it as furthering artistic freedom or as the end of photographic integrity, image-editing software is here to stay. With its straightforward editing tools, excellent color handling, and professional-quality output capabilities, it's no surprise that Adobe Photoshop is so popular.

In compiling these tips for version 2.0, I relied on the expertise of John Knoll and members of Adobe Systems' technical staff and public relations department, including Eric Zocher, Russell Brown, LaVon Collins, and Kathy Mandle.

Drawing a Geometric Shape

Unfortunately, some of the capabilities you take for granted in a painting program are missing from Photoshop. Most notably, it has no geometric painting tools for creating simple rectangles or ovals. But you can create such shapes with one or more selection tools and apply an outline to the selected area. For example, to create a rectangle filled with the current foreground color, draw a selection boundary with the rectangular marquee tool, then choose the Stroke command from the Edit menu and press return. Likewise, to make an oval, draw with the elliptical marquee tool and follow the same steps as above. To create a square or circle, press the shift key after beginning to draw with the rectangular or elliptical marquee tool. Draw any straight-sided polygon by option-clicking with the lasso tool to create the shape's sides. The shape closes the moment you release the option key. To draw more-sophisticated shapes, use the pen tool. Photoshop automatically anti-aliases curved shapes.

Lasso and Tighten

In painting programs, the selection area drawn with the lasso tool tightens around all enclosed pixels except those colored in the current background color. Photoshop's lasso tool selects all pixels inside the selection area, regardless of color. To create a tightened selection, select the desired image using the lasso. Then double-click on the magic wand icon in the toolbox to display the Magic Wand Options dialog box. Change the Tolerance option to 0, deselect the Anti-aliased check box, and press return or click on OK to dismiss the dialog box. With the magic wand still selected, ⌘-click on a portion of the selected area that is colored with the background color. That area becomes deselected, tightening the selection to the boundary of the desired image. If sections of the background color remain selected, then ⌘-click again with the magic wand to remove them.

Curved Lines with Arrowheads

Photoshop's automated arrowhead feature is useful for labeling an image, but adds arrowheads only to straight lines. To draw a curved line ending in an arrowhead, you must use a roundabout method.

1. Draw a curve using the pen tool, then close the shape by adding a few straight edges. Edit the shape as desired and click inside it to select it.

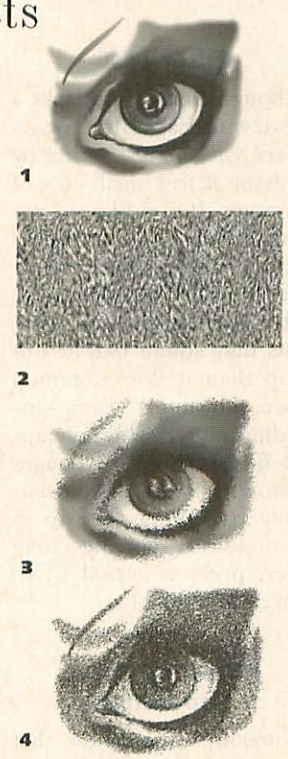
2. Choose the Stroke command, click the Inside button in the lower-right corner of the Stroke dialog box, and press return to outline the selection with the current foreground color.

3. While the outline is still selected, use the eraser tool to remove the unwanted

continues

Textured Effects

Both the paintings and the texture at right were created from start to finish using Photoshop 2.0 (no scanned images were used). I drew the eye (1) using a Wacom tablet but created the texture (2) without drawing a single line. I began by applying the Noise filter to a blank document several times to establish a field of random dots. I then applied the Emboss filter to give the dots some roughness, and repeatedly applied the Wave filter to mix it all up. By applying the Displace filter to the texture I had created, I achieved a rippling effect, shown here after being applied to the first eye (3). To create the final effect, I converted the first eye to a black-and-white image and then used the texture created above as a custom halftoning pattern (4).



PHOTOSHOP KEYBOARD COMMANDS

Operation	Shortcut
Hide/show floating windows	Tab
Add to selection	Shift-drag with selection tool
Subtract from selection	⌘-drag with selection tool
Cut all but intersected area of selection	Shift-⌘-drag with selection tool
Move selection in 1-pixel increments	Any arrow key
Clone selection	Option-drag or option-any arrow key
Move selection boundary but not selection	⌘-option-drag or ⌘-option-any arrow key
Resize cropping boundary	Drag corner handle
Rotate cropping boundary	Option-drag corner handle
Fill selection with current background color	Delete
Fill selection with current foreground color	Option-delete
Reapply last filter used	⌘-F
Bring up dialog box for last filter used	⌘-option-F
Paste from Clipboard and open Paste Controls dialog box	⌘-option-V
Change Opacity or Pressure setting in 10% increments	0 through 9 on keypad (0 is 100%)

portions of the outline. Because you selected the Inside button, the outline is contained in the selection and therefore will be fully erased.

4. Drag (or copy and paste) the selection to the desired position in the picture. Press ⌘-D to deselect the line, and drop it in place.

5. Configure a single arrowhead (At Start or At End, but not both) by double-clicking on the line icon in the toolbox. Then draw an extremely short line at the beginning or end of the curved line; this determines the angle of the arrowhead. Regardless of the length of the line, the line tool draws a full arrowhead. If it appears at the wrong angle, or points in the wrong direction, choose Undo (⌘-Z) and try again.

The Dip Option

Here's a trick that's short but useful. Normally, dragging with the smudge tool mixes a displayed color with its neighbor. However, you also have the option of "dipping" the tool in a bit of the foreground color. Press the option key as you drag with the smudge tool to paint briefly with the foreground color at the beginning of your smudge. The duration of the foreground color is determined by the Pressure setting in the Smudge Tool Options dialog box. Settings between 50% and 99% provide the best results. If you option-drag with the pressure set to 100% (press 0 on the keypad), the smudge tool paints constantly with the foreground color, as if using the paintbrush tool.

Filter Test

Although Photoshop lacks a previewing capability for its filters, you can test a filter by applying it to a small area of a picture. If you like the results, choose Undo and apply the filter to the full area, or just choose Undo if you're not happy with the outcome. This may sound like less of a tip than it does common sense, but most users—including myself—blithely apply filters to entire images without thinking. If you suddenly remember this tip in the middle of applying a long filter, press ⌘-period (.) to cancel the operation.

Changing Filter Submenus

Photoshop users know that you can use commands from the Filter menu to blur, sharpen, or distort the appearance of an image. However, few know that you can juggle some of those commands between the Filter menu's hierarchical submenus and even create submenus of your own. A special resource included inside every plug-in filter, called PiMI, specifies the name of the hierarchical submenu under which the filter command will appear. Using Apple's ResEdit utility, you change the name of the PiMI resource; if no such submenu exists, a new submenu will be created bearing the new PiMI resource name. The following steps describe how to segregate WaterColor, the sample Aldus Gallery Effects filter included with Photoshop, into a special submenu called Gallery FX.

1. Launch ResEdit (version 2.1 or higher is recommended) and open the file called GE-WaterColor in the Photoshop Plug-Ins folder.

2. Double-click on the PiMI icon (between PICT and STR). The PiMI window appears, displaying a single resource numbered 16,000.

3. Select this resource and choose the Get Resource Info command from the Resource menu (or press ⌘-I). The Info window appears.

4. The Name option box near the top of the Info window contains the name of the submenu under which the filter you are editing will appear. Note that the Name option box is currently empty; filters with no specific submenu name are grouped under the Other submenu. Enter Gallery FX into the Name option box.

5. Quit ResEdit. When the message "Save 'GE-WaterColor' before closing?" appears, press return to save changes.

6. Launch Photoshop and create a new file. Display the Filter menu. Choose the new Gallery FX command to display a submenu containing the single GE-WaterColor plug-in filter.

Revert via the Rubber Stamp

By option-dragging with the eraser tool you can make selected portions of an image revert to the appearance they had when the image was last saved to disk. Unfortunately, the eraser is a fixed size and has a hard edge. To vary the eraser's size and create anti-aliased restorations, use the rubber-stamp tool. Double-click on the tool to display the Rubber Stamp Options dialog box, then click on the Revert button. You can even change the value in the Opacity box to partially restore portions of an image, leaving translucent remnants of the new lines and shapes intact.

Saving Selections

Photoshop is one of the few bitmap programs that allow you to save a selection boundary without including the pixels inside it. There are two ways to save a selection; the first is to choose the Save Selection command from the Select menu. The Save Selection command appends a new channel to the current document and replaces the image on screen with a black window and the white selection channel. This procedure can be disconcerting the first time you encounter it.

A less confusing method for the user uninitiated in manipulating channels is to save selection boundaries as paths. Once you have the selection you want, choose the Make Path command from the Select menu to convert the selection to a Bézier-type path, and automatically assign points to it. Adjust the path as desired in Pen mode, then choose the Save Path command from the Pen menu. Name the path, press return, and then hit ⌘-D to exit Pen mode. The path is saved with the current picture. To recall the selection, choose the Load Path command from the Select menu. (Note that this method also may be used to save the outlines of newly

created characters of type, but if you are saving text outlines, or the boundary of a pasted image, be sure to first use the Paste Controls command to make the selection transparent. Otherwise, when you complete the path conversion, the contents of the selection will be a permanent part of your picture.)

Type Tip

Combined with Adobe Type Manager and built-in anti-aliasing, Photoshop is a fantastic text-effects tool. The following exercise is one example of Photoshop's versatility in manipulating text.

Large Text

1. Create some anti-aliased large text. This text is set in 140-point Helvetica Inserat with –2-point letter spacing. For best results, use a bright foreground color like blue, red, or green. Next, choose the Copy command.

Large Text

2. Choose the Feather command from the Select menu. Enter 8 for the Feather Radius value and press return. Select black as the foreground color and press option-delete to fill the selected area with black.

Large Text

3. Choose the Paste command. The copied text should exactly overlay its manipulated original. Nudge the pasted text up and to the left using the arrow keys.

Large Text

4. You can also fill the text with a gradation: while the type remains selected, click on it with the eye dropper tool to restore the original foreground color. Then change the background color to a lighter version of the same color. Finally, select the blend tool and drag from the top of the text to the bottom.

Creating Textures

Like many high-end graphics applications, Photoshop allows you to augment the appearance of an image by applying one or more textures (see "Textured Effects"). Photoshop 2.0 includes six textures in the Displacement Maps folder on the Plug-Ins disk, but after experimenting with them, you're likely to grow restless for more.

A nearly infinite variety of textures can be created without drawing a single line by simply applying several filters to a blank document. Start filling the document with random dots by applying the Noise filter several times to create a sufficiently grainy image. Then go wild. The Distort filters—including Ripple, Wave, and Zigzag—produce the best results, but the Stylize filters can also prove useful. There's no end to what you can do, so experiment away. When you're finished, save the texture to disk just as you would a standard file. Then open a scanned or hand-drawn image and merge it with the texture file using the Displace filter. If you're interested in creating black-and-white printouts, select a portion of the texture and choose Define Pattern from the Edit menu. Then open a gray-scale image, choose the Bitmap command from the Mode menu, and click on the Custom Pattern button. For the price of your labor, you'll get a custom mezzotint, an image your ancestors would have given their right molars to create. ■

See *Where to Buy* for contact information.

DEKE McCLELLAND has authored more than 20 computer books. His most recent title, *Everything You Need to Know about Macintosh System 7* (Sybex, 1992), is designed for intermediate and advanced users.

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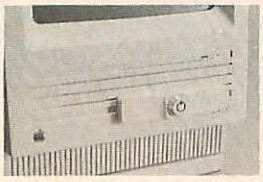
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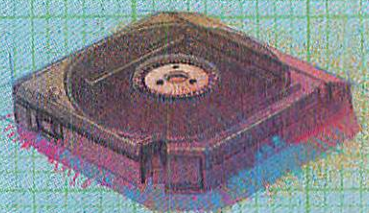
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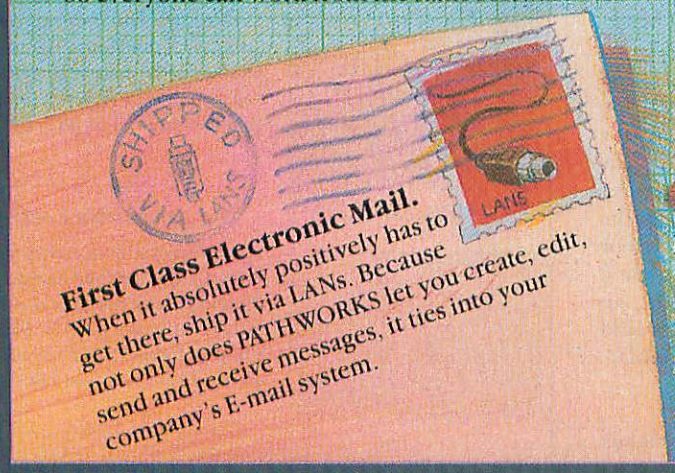
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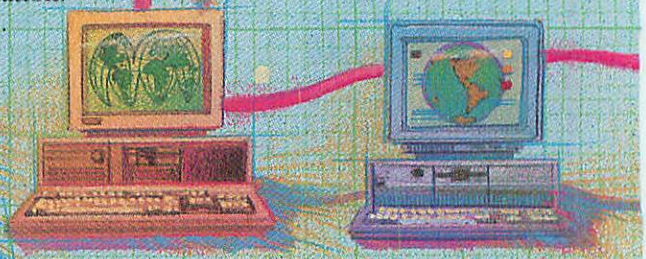


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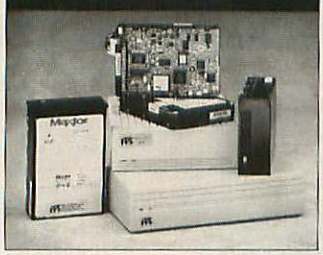
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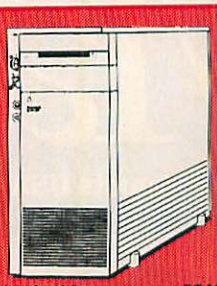
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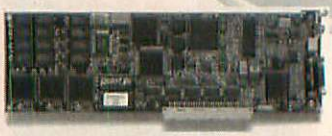
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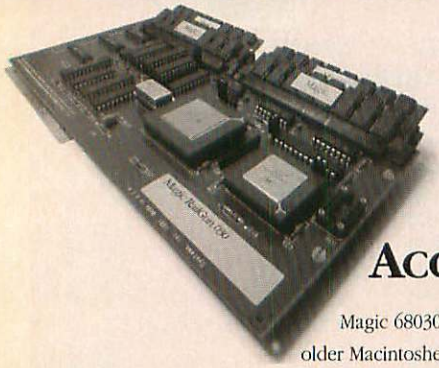
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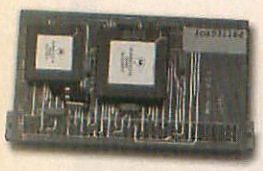
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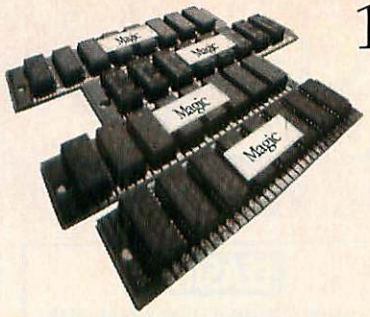
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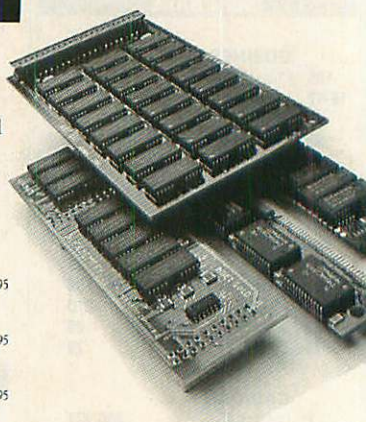
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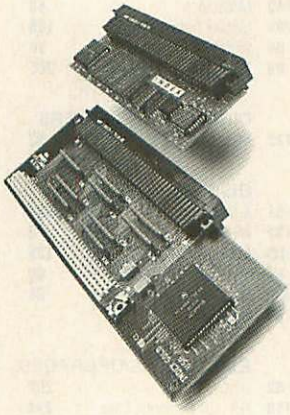
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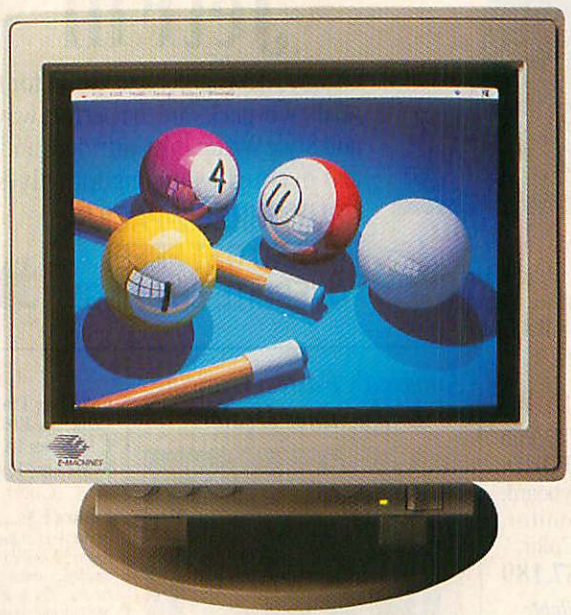
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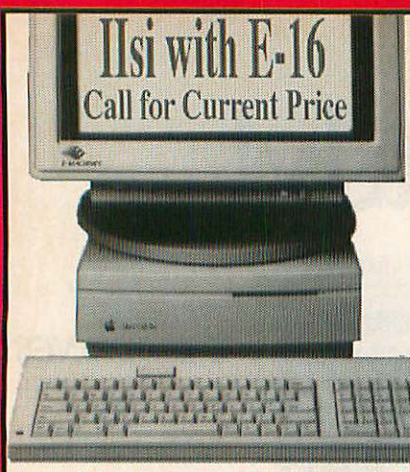
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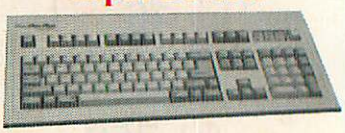
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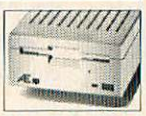
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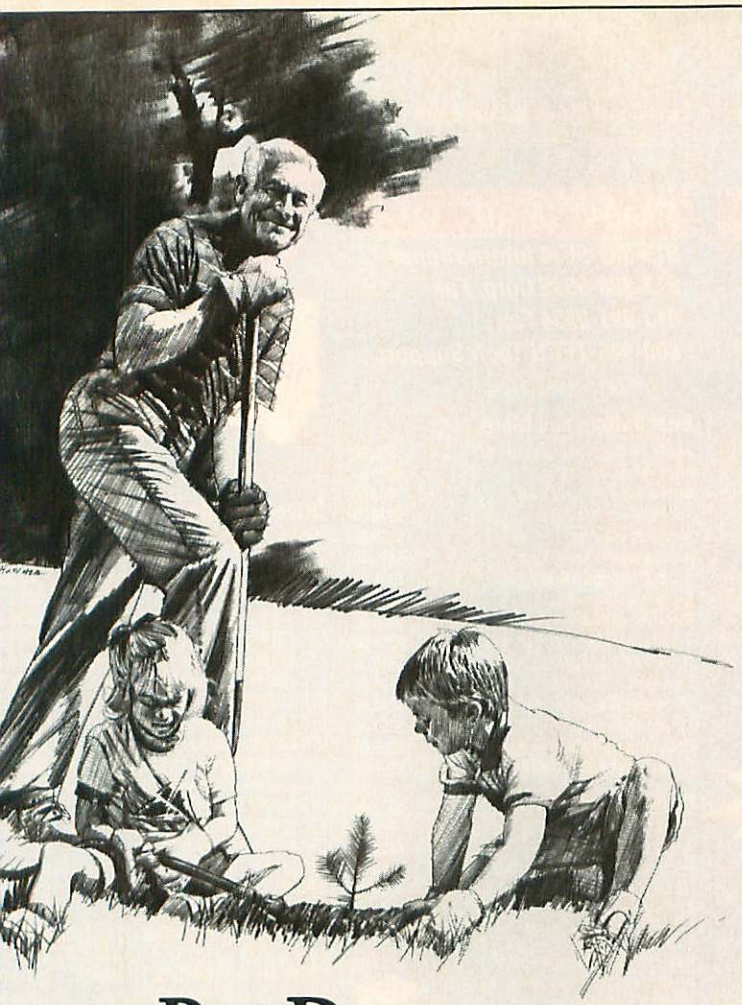


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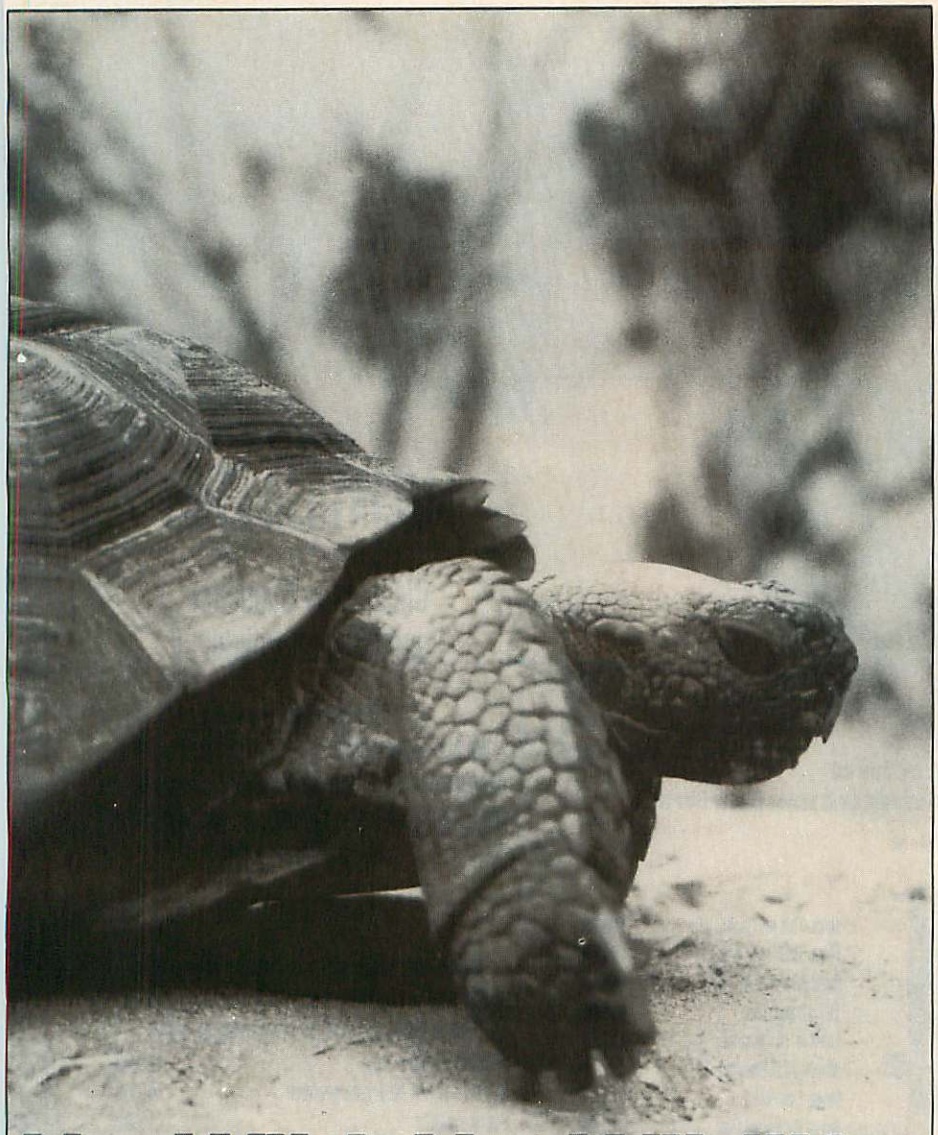
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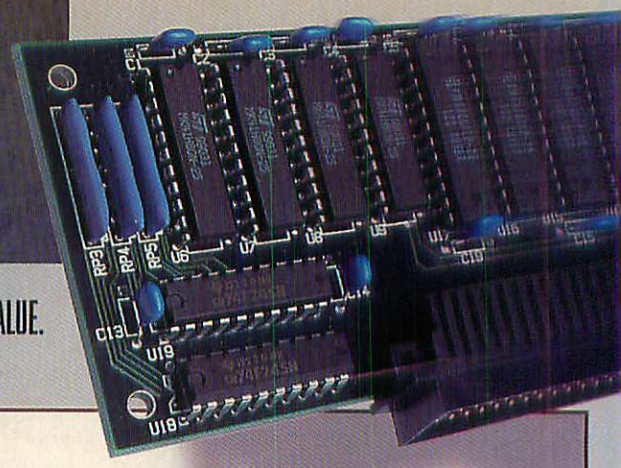
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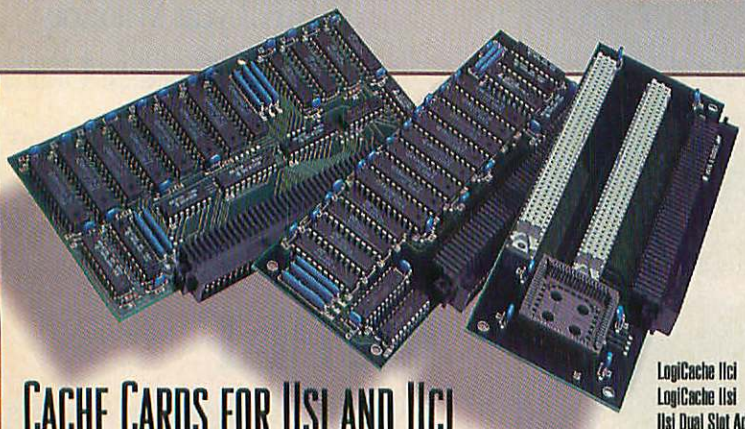
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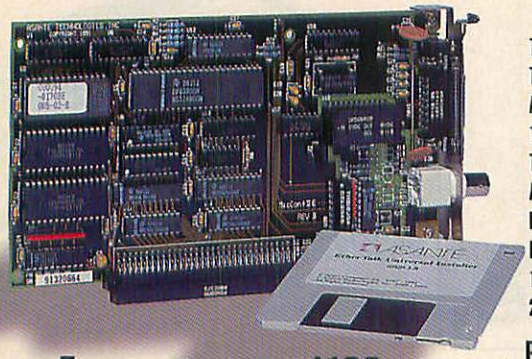
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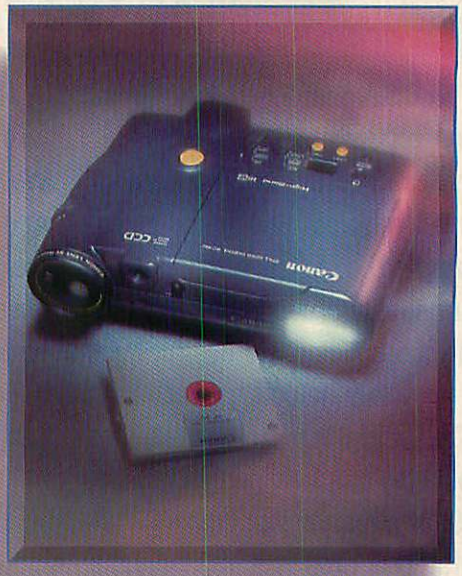
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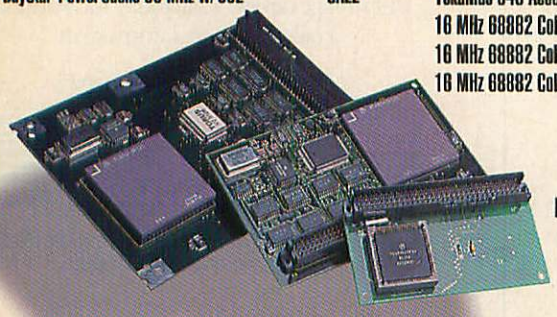
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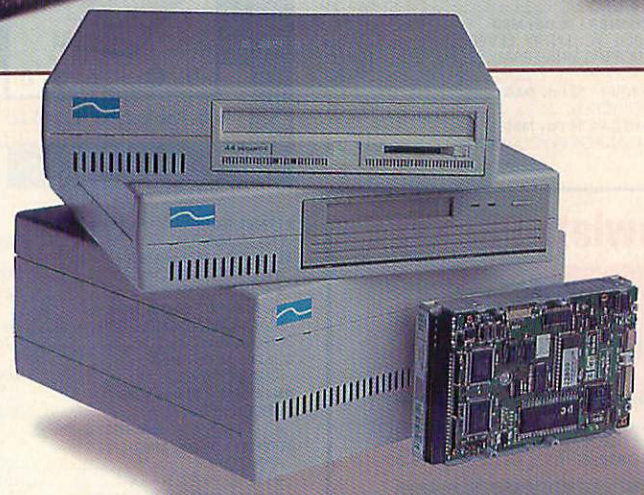
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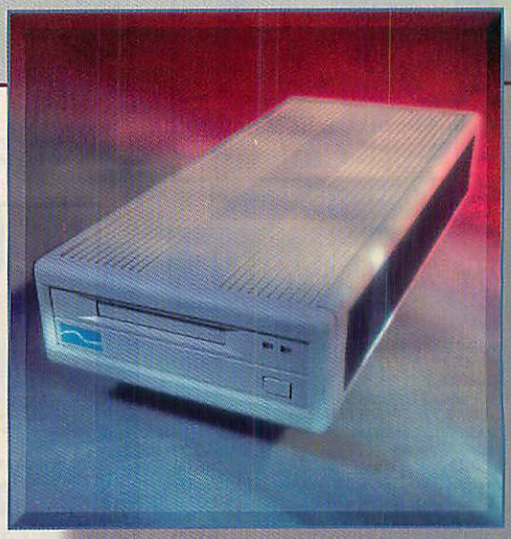


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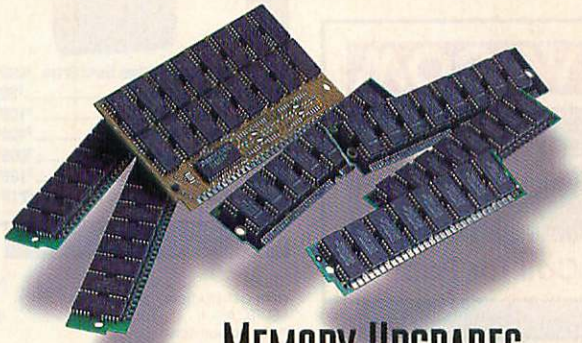
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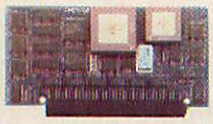
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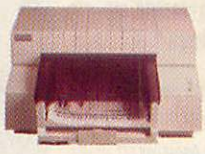
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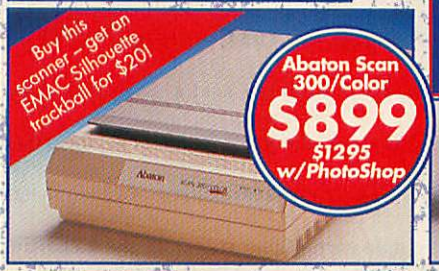
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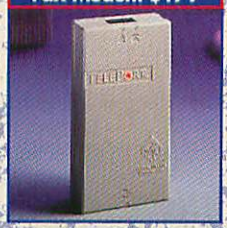
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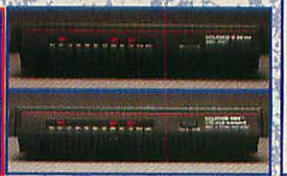
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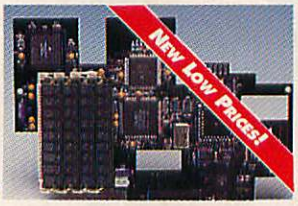
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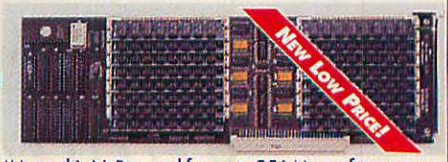
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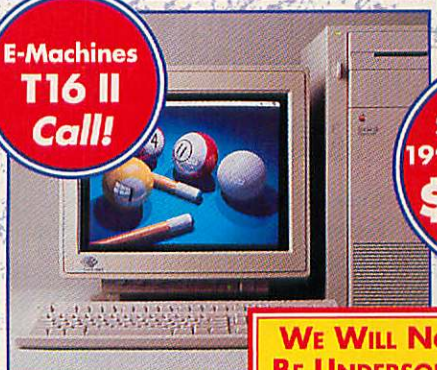
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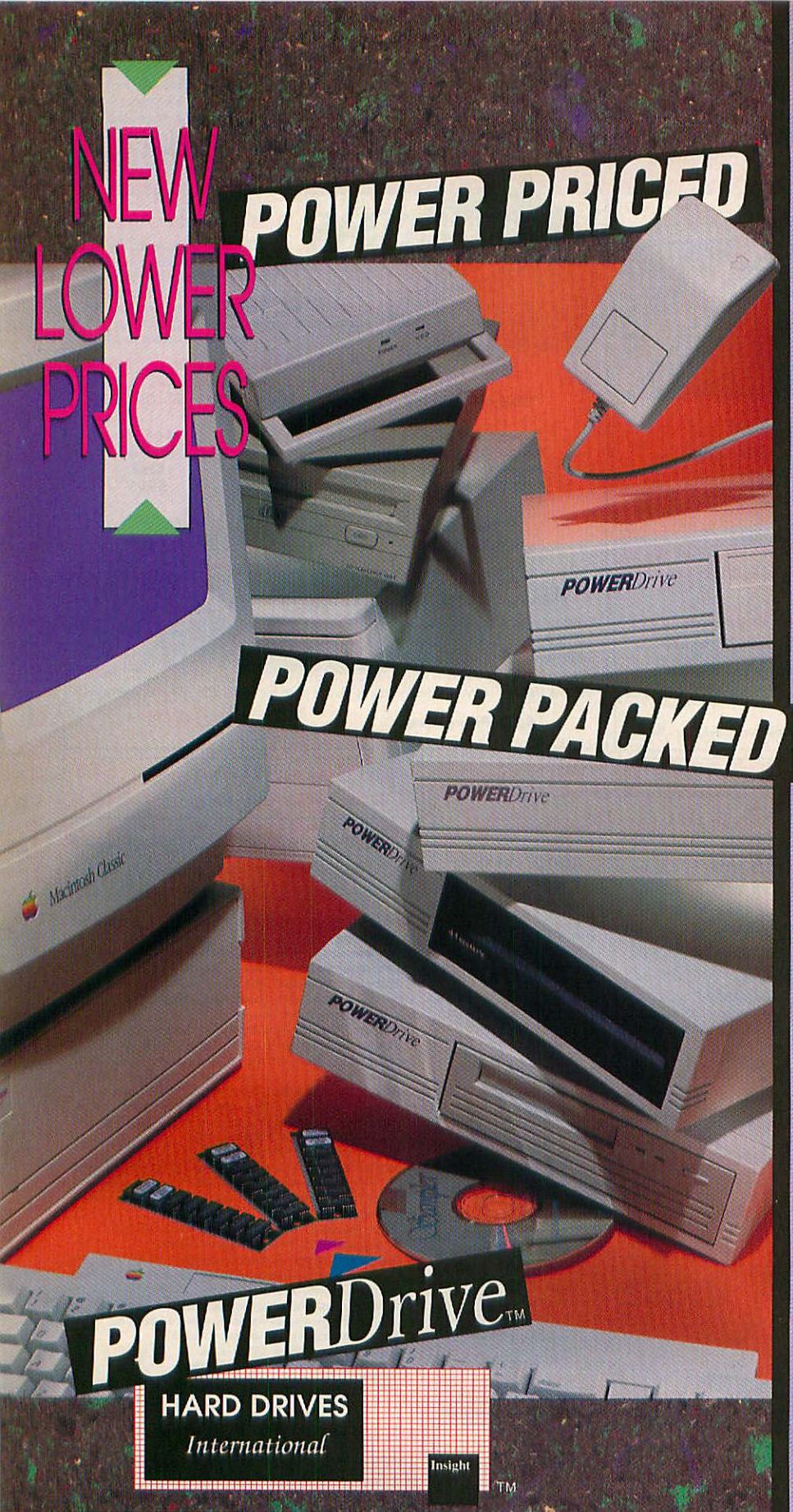
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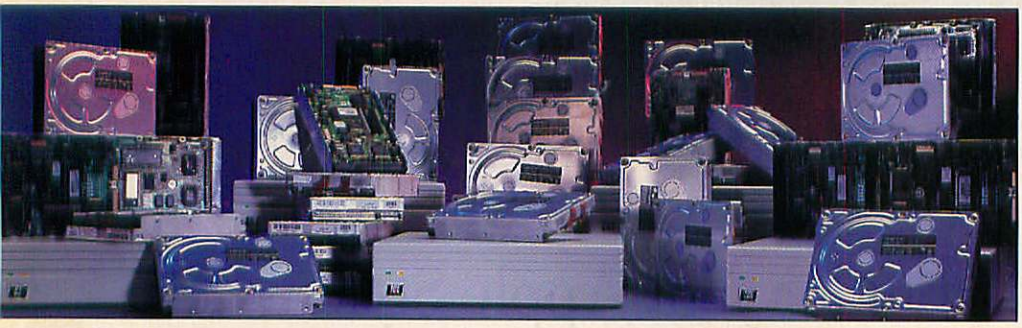
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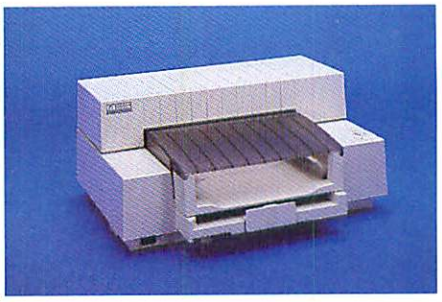
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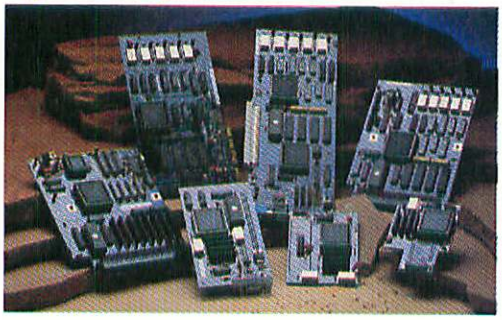
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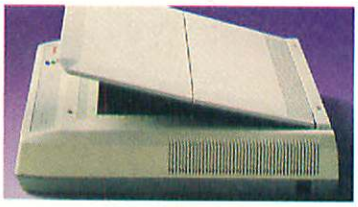
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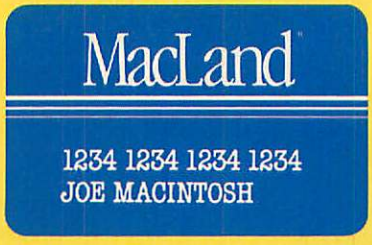


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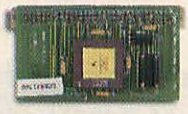
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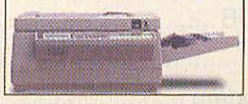
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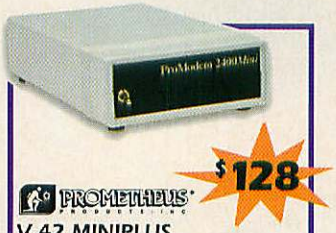
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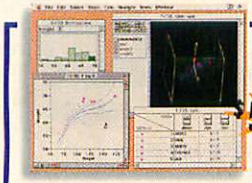
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BHE

PRESENT HE HAD SENT HER A FEW ADS AGO. "I SEE YOU'RE WEARING MY DAISY-CHAIN. DOES THIS MEAN YOU DON'T NEED MAC ANYMORE?" HE ASKED. "I'LL ALWAYS NEED MY MAC," SHE REPLIED. "BUT YOU ARE FOREVER THE APPLE OF MY EYE."

AND LET OUT A SIGH. "HHHHMM. HARVEY MUST HAVE SOMEHOW CAUGHT WORD OF MY EXCURSION WITH MAC TO THE MICROPOLIS COAST. IF ONLY HE REALIZED THAT OUR RELATIONSHIP IS AN EXTERNAL CASE!" SHE THOUGHT. THE TRAIN RATTLED ON. HER MIND WHIRLED. SUDDENLY, WHAT TO HER WANDERING EYES SHOULD APPEAR, WHOLESALE HARVEY COMING NEAR. HE PUSHED THROUGH THE QUANTUM CROWD AND SPOTTED THE

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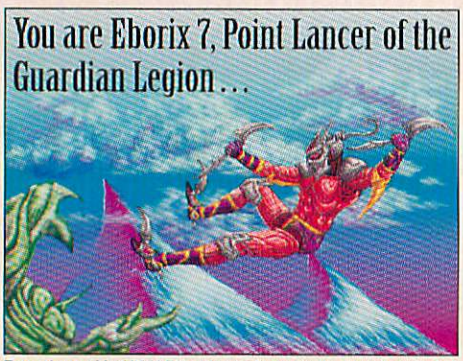
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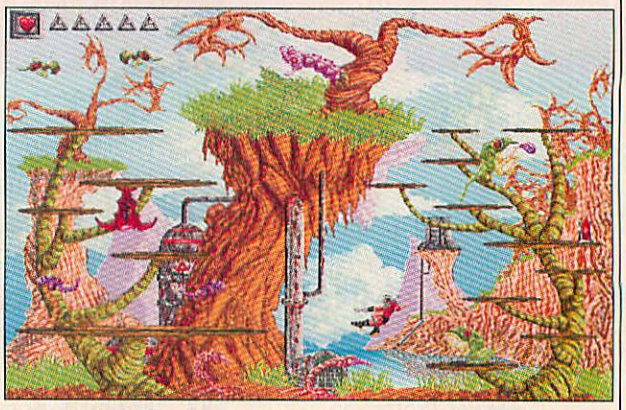
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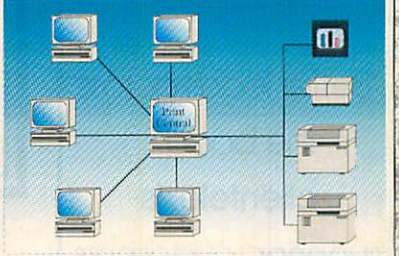


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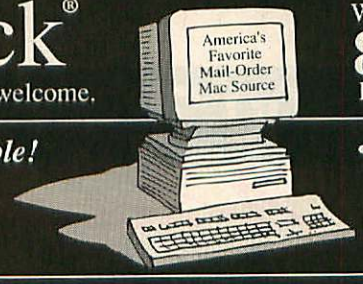
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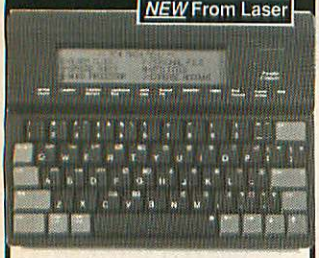
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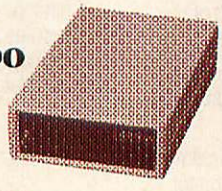
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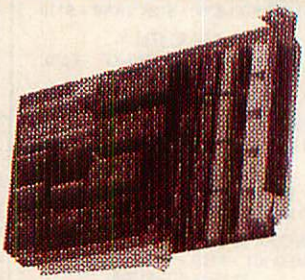
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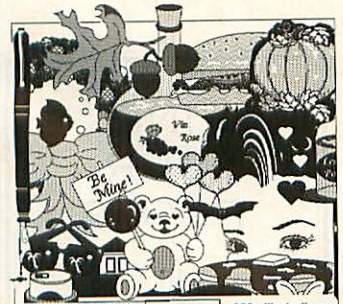
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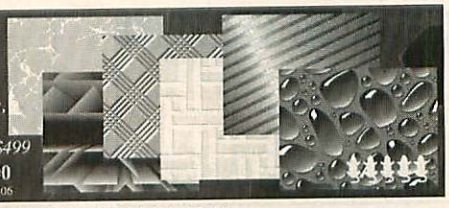
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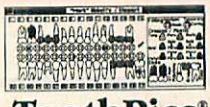
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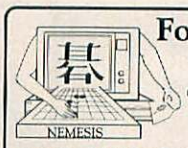
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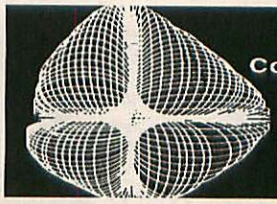
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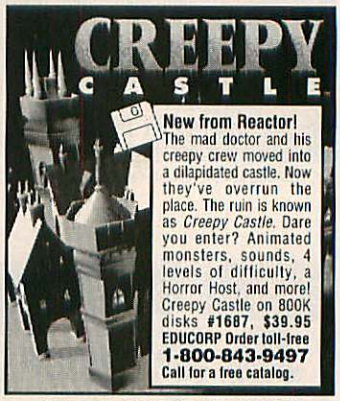
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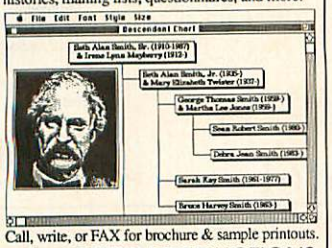
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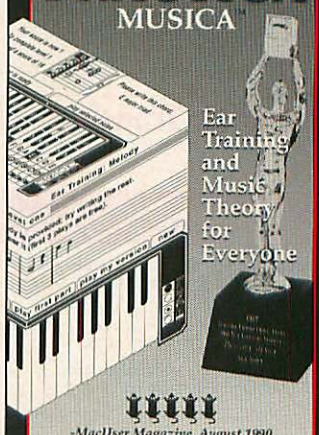
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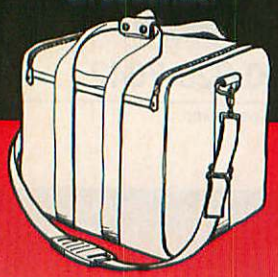
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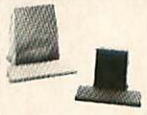
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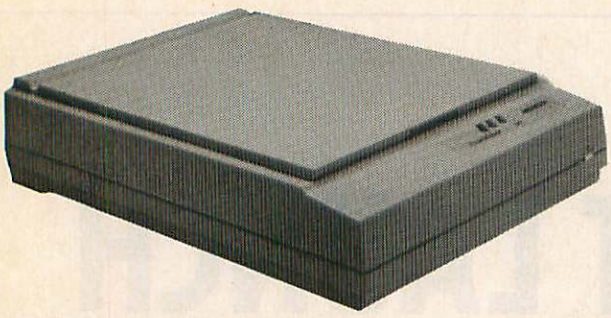
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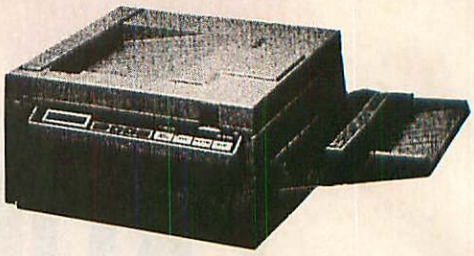
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Mac Powerbook 100 2/20 w/external drive	2190
Mac Powerbook 140 2/20	2590
Mac Powerbook 140 2/40	2790
Mac Powerbook 140 4/40	3090
Mac Powerbook 170	Call

MONITORS

IKegami	
CT20 Color Trinitron & CT 2010 Mono	1845/825
CN20 Color INVAR Tube	1845
CT20 w/8 Bit Card	2399
CT20 w/24 Bit Card	3049
Radius	
19" Precision Color Display	2290
21" Color Display	3125
Color Pivot	**1249**
Color Pivot Interface II, LC, IIsi, SE, SE/30	**515**
Full Page System for Classic	825
Full Page System for LC	885
Full Page System for SE	825
Pivot Display for Built-in Video	799
Two Page Display 19"	959

MONITORS (cont.)

	Price
Two Page Display 21"	1230
Two Page Display Interface SE, SE/30, II, IIsi	399
Precision 8 interface	515
Precision 24x	1700
Precision 8x	799
Rocket Accelerator	1700
Apple	
Apple 13" Highres	649
Seiko	
Seiko CM-1445	569
SuperMac	
Platinum 19" Display	964
Platinum Two-Page Display	1239
Super Match 19" Color	1929
Super Match 21" Two-Page Color Display	3031
Dual-Mode Trinitron 19"	2893
Thunder/8	1259
Thunder/24	3299
Spectrum 8.24 PDQ	899
Magnavox	
14" Color Monitor	499

DRIVES

	Ext.	Internal
Quantum 105 Pro	469	369
Quantum 210 Pro	835	710
Maxtor 120		399
Maxtor 213		659
Maxtor 340		1099
Maxtor 180 meg	1800	
Syquest 44MB	519	
Syquest 88MB	879	
Internal Drive Kit		29
Syquest 44MB cart.		75

SOFTWARE

Microsoft Word	269
Microsoft Excell	309
Aldus Pagemaker	497

SOFTWARE (cont.)

	Price
Caere Omnipage	499
Adobe Photoshop 2.0	515
Quark Express	529
Adobe Streamline	69

PRINTERS

Microtek TrueLaser	**1349**
TI Microlaser PS35	1519
TI Microlaser PS17	1219
HP Deskwriter	439
HP Deskwriter Color	**739**
QMS PS410	**1699**
NEC Model 90	1579
HP Deskwriter Ink Cartridge	18
Appletalk Connectors	25
Apple Laserwriter IIf	2799
Apple Laserwriter IIg	3533

SCANNERS

Logitech ScanMan 32	279
Microtek 600ZS w/Photoshop	1349
Microtek 1850S Slide Scanner	**1895**
Caere Typist	420

MODEMS

Zoom	
FX9624 Plus 2400 BPS	139
Modem MX 2400S w/SendFax 9600 BPS	105
v.32 Turbo w/v.42*bis* w/MNP software	445
Dove Fax Modem 9624+	295

ACCELERATORS

Daystar	
40 Mhz PowerCache	889
50 Mhz PowerCache	1329
50 Mhz PowerCache w/68882	1599
Radius Rocket	1700

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Profile

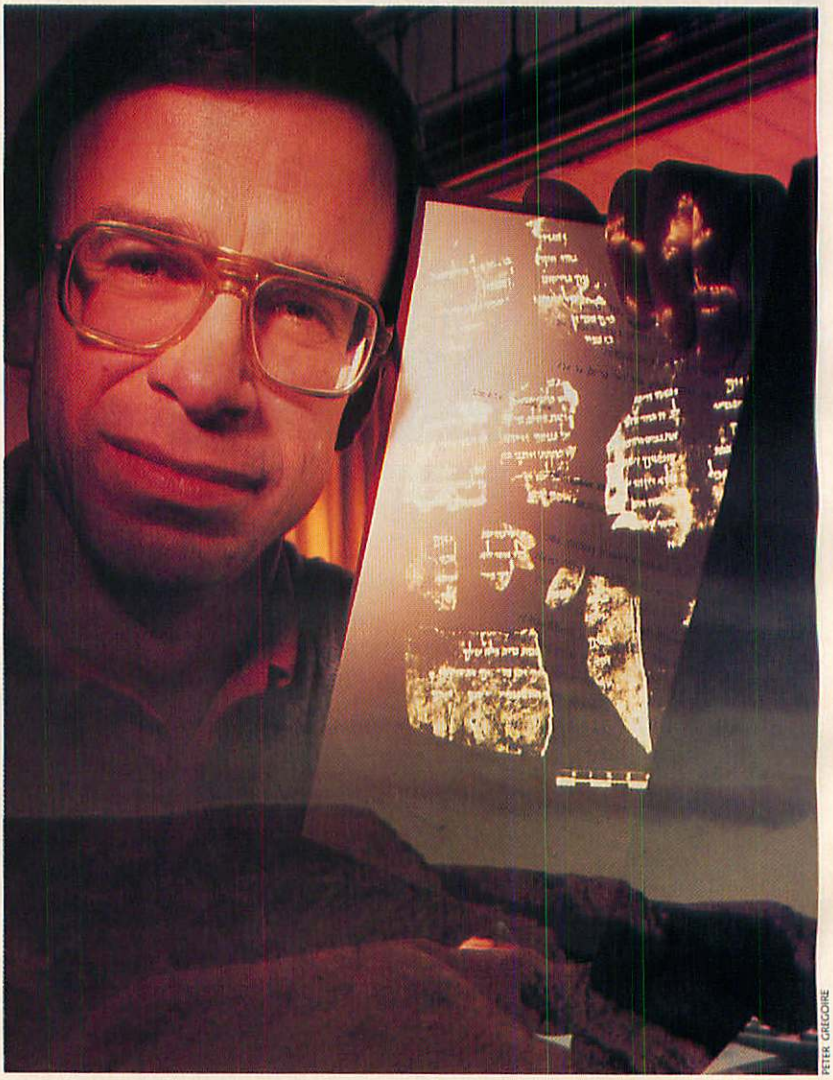
RENEGADE SCHOLAR

MUCH OF THE SO-CALLED DEAD Sea Scrolls have been under lock and key since the late 1940s, held hostage by an official editorial team working out of the Rockefeller Museum in Jerusalem. The nearly-2000-year-old manuscripts have been called "the greatest windfall in the history of Biblical archaeology." Although the fragments (like those in the photo, right) had been organized, photographed, and transcribed by the late 1950s, the editors were unwilling to release them. Decades passed with little progress.

Enter Martin Abegg, a man with a Mac. The graduate student and his advisor, professor Ben-Zion Wacholder, reconstructed transcriptions of 23 unpublished manuscripts and rushed them into print. The key to the manuscripts they liberated was a concordance, or card index, prepared by the official editorial team. The index listed the location and context of each Hebrew and Aramaic word that appeared in some 220 unpublished documents.

Abegg was able to reconstruct the transcription of specific manuscripts using a simple database in Foxbase+/Mac on his 030-based Mac SE. Each record included a text string and reference information. After sorting the entries by manuscript name and text-string line number, Abegg exported the document into a HyperCard program he wrote to glue common text strings together. Using Microsoft Word, he formatted the reconstructed transcription.

The result of their controversial work, *A Preliminary Edition of the Unpublished Dead Sea Scrolls* (One Book Publishing), came out in September 1991. Official editors were outraged; other scholars cheered. The Israeli Antiquities Authority, which oversees the documents, first threatened legal action and then decided to make the material broadly available.—DEBORAH BRANSCUM



PETER GREGOIRE

Martin Abegg

DOCTORAL CANDIDATE,

HEBREW UNION COLLEGE

CINCINNATI, OHIO



WHAT DO PEOPLE SEE IN OTHER CD-ROM DRIVES?

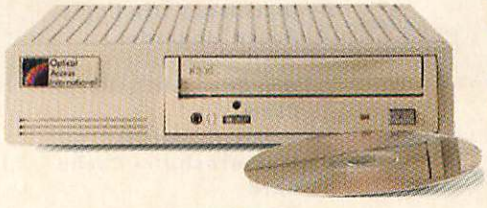
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Best-Sellers

MARCH 1992

Business Software

Months on chart	Last month	This month		
82	2	1	**Microsoft Word**	*Microsoft Corporation*
73	1	2	**Microsoft Excel**	*Microsoft Corporation*
4	3	3	**Microsoft Office**	*Microsoft Corporation*
60	4	4	**Microsoft Works**	*Microsoft Corporation*
58	13	5	**MacWrite II**	*Claris Corporation*
2	7	6	**Calendar Creator**	*Power Up Software Corporation*
3	11	7	**Aldus Persuasion**	*Aldus Corporation*
20	9	8	**Quicken**	*Intuit*
69	8	9	**Aldus PageMaker**	*Aldus Corporation*
16	12	10	**MacProject**	*Claris Corporation*
3	—	11	**MacDraw Pro**	*Claris Corporation*
34	5	12	**WordPerfect for the Macintosh**	*WordPerfect Corporation*
34	10	13	**FileMaker Pro**	*Claris Corporation*
4	15	14	**Microsoft PowerPoint**	*Microsoft Corporation*
58	6	15	**MacDraw II**	*Claris Corporation*

Education Software

Months on chart	Last month	This month		
49	1	1	**Reader Rabbit**	*The Learning Company*
35	3	2	**Where in the World Is Carmen Sandiego?**	*Broderbund Software*
16	2	3	**Where in Time Is Carmen Sandiego?**	*Broderbund Software*
21	4	4	**Where in the USA Is Carmen Sandiego?**	*Broderbund Software*
60	5	5	**Math Blaster**	*Davidson & Associates*

Entertainment Software

Months on chart	Last month	This month		
47	1	1	**Microsoft Flight Simulator**	*Microsoft Corporation*
12	2	2	**SimEarth**	*Maxis*
26	3	3	**SimCity**	*Maxis*
4	4	4	**Bridge**	*Artworx*
1	—	5	**Chessmaster 2000**	*Electronic Arts*

Network/Data Communications

Months on chart	Last month	This month		
14	1	1	**MacLink Plus**	*DataViz*
15	2	2	**White Knight**	*FreeSoft*
16	4	3	**Timbuktu**	*Farallon Computing*
61	3	4	**TOPS**	*Sitka Corporation*
9	5	5	**Smartcom II**	*Hayes Microcomputer Products*

Add-In Boards

Months on chart	Last month	This month		
11	2	1	**Macintosh IIsi NuBus Adapter Card**	*Apple Computer*
2	—	2	**Macintosh IIfx Logic Board Upgrade**	*Apple Computer*
2	—	3	**MacCon+ 30i Ethernet Card**	*Asante Technologies*
2	1	4	**Macintosh IIci Cache Card**	*Apple Computer*
15	3	5	**Macintosh Display Card 8•24**	*Apple Computer*

Utility Software

Months on chart	Last month	This month		
10	1	1	**After Dark**	*Berkeley Systems*
17	2	2	**The Norton Utilities for the Macintosh**	*Symantec Corporation*
3	4	3	**Suitcase II**	*Fifth Generation Systems*
2	3	4	**More After Dark**	*Berkeley Systems*
11	5	5	**Virex**	*Microcom*

The AmCoEx Index of Used Mac Prices

Machine/RAM/ Hard Drive	Average Sale Price	Monthly Change
Mac Plus/1MB/none	$550	0
Mac Plus/2MB/20MB	$850	+50
Mac SE/2MB/20MB	$1000	0
Mac Portable/1MB/40MB	$1500	–100
Mac Classic/2MB/40MB	$1000	–75
Mac SE/30/2MB/40MB	$2000	–150
Mac LC/2MB/40MB	$1400	–100
Mac II/4MB/40MB	$1950	0
Mac IIcx/4MB/80MB	$2800	–100
Mac IIci/4MB/80MB	$3200	–500
Mac IIfx/4MB/80MB	$4300	–200
Apple 12-inch B&W display/board	$325	+25
Apple 13-inch RGB display/board	$700	0
LaserWriter Plus	$1250	–50
LaserWriter IINT	$1900	0

Index provided by the American Computer Exchange of Atlanta, Georgia. It reflects sales during the week of December 20. Configurations include keyboard and exclude monitor and display board for noncompact models.

Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during November 1991.

"Don Says Mirror's New Monochrome Displays Are Clearly Their Best Product...



Don Rittner, President of
M.E.C.C.A. User Group
Editor of MUG News Service

$449 *for built in video*
(call for other options).

19" $799 *with card.*

21" $999 *with card.*

oes He Know?"

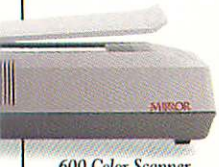
Members of Macintosh Enthusiasts Club of the Capital Area

issue of *MacUser* magazine. Featuring world class Trinitron quality so your most critical projects look flawless, the ProViews are still affordably priced.

"The ProView can handle my most demanding applications with ease; and best of all, I can afford it."

— Michael Levy

The Mirror Color Scanner, according to Nancy, is a remarkable product; 600 dpi 24-bit scanning for only $1299 including Adobe Photoshop 2.0. It has more features and higher quality than competing models, yet is priced far less.



600 Color Scanner

"This would be a good scanner for $2000; for $1299 it's unbelievable."

— Nancy M. Benz

In December 1991 *MacUser* gave this scanner 4 mice, saying, "the quality of the hardware is excellent." and it "produced the best images."

If you need to get color or gray-scale images into your work, the Mirror Color Scanner is for you.



"Mirror's 88MB SyQuest drive solved my growing storage problem."

— John H. Galligan

Mirror offers hard drives from 30 MB to 1 Gigabyte, and each one has the quality features that won John over: top quality drive mechanisms, rugged steel chassis, external termination and SCSI address switch, convenience outlets and a two year warranty.

HARD DRIVES	INT.	EXT.
45MB	$269	$329
50MB(Q)	$289	$349
80MB	$299	$369
105MB(Q)	$419	$479
210MB(Q)	$739	$799
45MB Rem.*	N/A	$479
88MB Rem.*	N/A	$649
CD ROM	N/A	$599
45MB SyQuest Cartridge		$63
88MB SyQuest Cartridge		$99

Call for other capacities.
**Price Includes one cartridge*

Whether you need a zero-footprint drive, a super compact portable drive, or an 88 or 45 MB Syquest drive, Mirror's got the right stuff.

Tough customers all over choose Mirror products for quality, performance and value. We offer a complete line of Macintosh peripherals including hard drives, displays, scanners, CD-ROM drives, and tape back-up units.

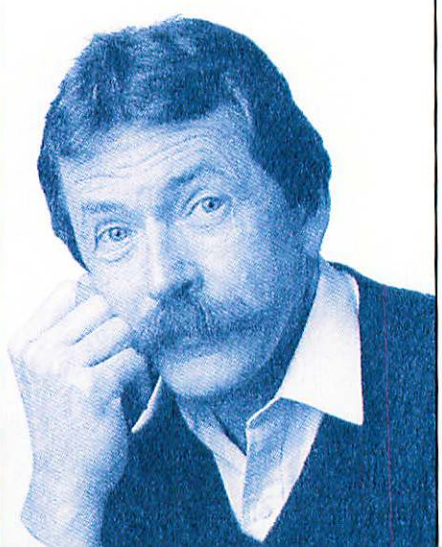


Call for our free catalog to read what the experts say about Mirror peripherals. Superior products, superior value, all backed by our famous **30-day, "love it or return it" guarantee.***

Nancy M. Benz, member



John H. Galligan, member



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Circle 125 on reader service card

...But What Do

At Mirror, we build quality, reliability and value into every single product, so we've got power users all over the country talking about them. It's the kind of talk we love to hear.

"Unarguably the best products in the Mirror line."

— Don Rittner

Don Rittner, president of M.E.C.C.A., thinks that monochrome monitors are Mirror's best products. But members of his own users' group disagree.

It's possible that Don may be right. After all, we've just introduced a new 21" two-page† and a 15" full-page display. Use them with a built-in video port on some Macs or with a Mirror monochrome video card for a sharp, bright view of your work.

Stephen C. Frantz, Ph.D., member



The 19" two-page display comes with a monochrome video card for the SE, Classic, LC, SE/30, MacII or Quadra.

All three systems feature high-contrast, razor-sharp images, reduced VLF and ELF emissions, and built in ADB ports for reduced cable clutter.

Stephen Frantz prefers Mirror's color monitors because there's one for every need and budget. Like the 14" for example.

14" Color	*$399**
16" Trinitron	*$1299**
w/ 8-bit card	*$1699*
20" Trinitron, 8-bit	*$2499*
20" Trinitron, 24-bit	*$2999*

** for built in video ports*

"Mirror's 14" color is under 400 bucks, and it looks great."

— Stephen C. Frantz

It gives you large screen color for a monochrome price, 640 X 480 resolution for 56% more work-space than Apple's 12" monitor, and brilliant color from the built-in video port of your LC, IIsi, IIci or Quadra.

"Mirror's done it again. This is a real breakthrough, a 16" Trinitron for $1299."

— Hilary Koppel

Stephen is not the only one excited about Mirror color systems. Hilary loves the new 16" Trinitron. Designed for the pro who demands the highest quality, but can't justify the high cost, the Mirror 16" Display has 832 X 624 resolution for comfortable viewing of two-page layouts or large spreadsheets.

Use Mirror's 16" Trinitron with the built-in video port on IIsi, IIci or Quadra, or our optional video card for any MacII.

If you need a no compromise two-page color display, Michael advises checking out the Mirror ProView.



Available in 8-bit or 24-bit models, the ProView is "a real bargain" according to the May '91

Michael Levy, member

Hilary Koppel, member









Kensington Anti-Glare Filters.

One Size Does Not Fit All.

Unlike generic filters where one size fits all, Kensington filters are made to fit only specific monitors. For example, our anti-glare filter for the Apple 12" Color Monitor (*shown above*).

Because the fit is customized, it covers your monitor like a mask. So light always passes through the filter, never around it.

And every one is made of durable, optical quality glass with unique anti-reflection and scratch resistant coatings.

The result?

Glare is reduced by 96%. Contrast and clarity are improved up to 20 times.

But anti-glare filters are ugly, you say.

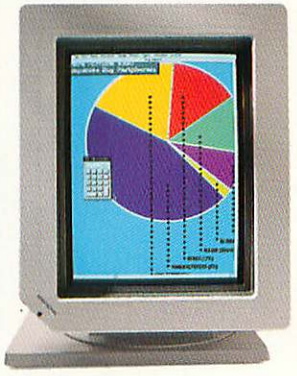
Not ours. Since our filters are designed for specific monitors, they really look like part of your monitor. The styling is complementary. The color identical. Even the same material is used.



Maccessories® Classic® Filter

Today, anti-glare filters play an important role in improving overall VDT safety conditions as defined by new federal and state legislation. (Eye fatigue, headaches and stress have all been linked to today's bigger and brighter screens.)

So the next time you want an anti-glare filter for your monitor, choose the one made just for your monitor. Kensington.



Radius Pivot™ Filter

For a free brochure of all Kensington products, including our complete line of anti-glare filters for Macintosh, SuperMac, Radius and RasterOps monitors, call 800-535-4242. In California and outside the U.S. 415-572-2700.



KENSINGTON

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